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J.E.B.

TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

TWENTY-NINTH ANNUAL SESSION,

HELD AT SARATOGA SPRINGS, N. Y.,

COMMENCING ON THE 6TH OF AUGUST, 1889.

BOSTON MEDICAL LIBRARY ASSN. NOV 8 1889

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CATALOGUED,
J. F. B.
11.8.1893

PRESS OF PATTERSON & WHITE,
PHILADELPHIA.

LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT	Chicago.
Secretary,	J. TAFT	Cincinnati.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter last Tuesday in July.]

President,	W. H. ATKINSON	Cleveland.
1st Vice-President,	J. B. GIBBS	Washington, D. C.
2d Vice-President,	W. CAHOON	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	W. MUIR ROGERS	Shelbyville, Ky.
Treasurer,	S. DILLINGHAM	Philadelphia.

[NO MEETING IN 1861.]

CLEVELAND, JULY, 1862.

President,	GEO. WATT	Xenia, Ohio.
1st Vice-President,	W. H. ALLEN	New York City.
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Recording Secretary,	J. TAFT	Cincinnati.
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2d Vice-President,	WM. B. HURD	Brooklyn, N. Y.
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Corresponding Secretary,	C. R. BUTLER	Cleveland.
Treasurer,	A. C. HAWES	New York City.

NIAGARA FALLS, JULY, 1864.

President,	J. H. MCQUILLEN	Philadelphia.
1st Vice-President,	C. P. FITCH	New York City.
2d Vice-President,	H. BENEDICT	Detroit.
Recording Secretary,	J. TAFT	Cincinnati.
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Treasurer,	I. J. WETHERBEE	Boston.

Chicago, July, 1865.

President,	C. W. Spalding	St. Louis.
1st Vice-President,	Geo. H. Cushing	Chicago.
2d Vice-President,	Jas. McManus	Hartford.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	L. D. Shepard	Boston.
Treasurer,	I. J. Wetherbee	Boston.

Boston, July, 1866.

President,	C. P. Fitch	New York City.
1st Vice-President,	W. H. Morgan	Nashville.
2d Vice-President,	L. D. Shepard	Boston.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	A. Hill	Norwalk, Conn.
Treasurer,	W. W. Sheffield	New London, Conn.

Cincinnati, July, 1867.

President,	A. Lawrence	Lowell, Mass.
1st Vice-President,	P. G. C. Hunt	Indianapolis, Ind.
2d Vice-President,	A. S. Talbert	Lexington, Ky.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	C. R. Butler	Cleveland.
Treasurer,	W. H. Goddard	Louisville, Ky.

Niagara Falls, July, 1868.

President,	Jonathan Taft	Cincinnati.
1st Vice-President,	Homer Judd	St. Louis.
2d Vice-President,	A. A. Blount	Springfield, Ohio.
Recording Secretary,	Edgar Park	St. Louis.
Corresponding Secretary,	Jas. McManus	Hartford.
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Saratoga Springs, August, 1869.*

President,	Homer Judd	St. Louis.
1st Vice-President,	S. J. Cobb	Nashville.
2d Vice-President,	C. E. Francis	New York City.
Recording Secretary,	M. S. Dean	Chicago.
Corresponding Secretary,	I. A. Salmon	Boston.
Treasurer,	W. H. Goddard	Louisville.

*Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election; and the sessions of and after 1869 commenced on the first Tuesday in August.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN	Nashville.
1st Vice-President,	S. W. DENNIS	San Francisco.
2d Vice-President,	J. R. WALKER	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON	Boston.
Treasurer,	W. H. GODDARD	Louisville.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

President,	GEO. H. CUSHING	Chicago.
1st Vice-President,	C. E. FRANCIS	New York City.
2d Vice-President,	J. R. WALKER	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON	Boston.
Treasurer,	W. H. GODDARD	Louisville.

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President,	P. G. C. HUNT	Indianapolis.
1st Vice-President,	L. D. SHEPARD	Boston.
2d Vice-President,	G. A. MILLS	Brooklyn, N. Y.
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Corresponding Secretary,	J. TAFT	Cincinnati.
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President,	T. L. BUCKINGHAM	Philadelphia.
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Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD	Louisville.

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2d Vice-President,	J. S. KNAPP	New Orleans.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD	Detroit.
Treasurer,	W. H. GODDARD	Louisville.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP	New York City.
1st Vice-President,	H. J. MCKELLOPS	St. Louis.
2d Vice-President,	H. A. SMITH	Cincinnati.
Recording Secretary,	C. STODDARD SMITH	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN	Philadelphia.
Treasurer,	W. H. GODDARD	Louisville.

PHILADELPHIA, AUGUST, 1874.

President,	GEO. W. KELLY	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE	Philadelphia.
2d Vice-President,	CORTLANDT PALMER	New York City.
Recording Secretary,	C. STOLLARD SMITH	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN	Philadelphia.
Treasurer,	W. H. GODDARD	Louisville.

CHICAGO, AUGUST, 1877.

President,	F. H. BEHWINKEL	Cincinnati, Ohio.
1st Vice-President,	L. D. SHEPARD	Boston.
2d Vice-President,	GEO. T. BARKER	Philadelphia.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD	Louisville.

NIAGARA FALLS, AUGUST, 1878.

President,	H. J. MCKELLOPS	St. Louis.
1st Vice-President,	L. D. SHEPARD	Boston.
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Treasurer,	W. H. GODDARD	Louisville.

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President,	L. D. SHEPARD	Boston.
1st Vice-President,	C. N. PEIRCE	Philadelphia.
2d Vice-President,	GEO. L. FIELD	Detroit.
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Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
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1st Vice-President,	W. C. BARRETT	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS	New Orleans.
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Corresponding Secretary,	A. M. DUDLEY	Salem, Mass.
Treasurer,	W. H. GODDARD	Louisville.

NEW YORK, JULY, 1881.

President,	H. A. SMITH	Cincinnati.
1st Vice-President,	W. C. BARRETT	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS	New Orleans.
Recording Secretary,	GEO. H. CUSHING	Chicago.
Corresponding Secretary,	A. M. DUDLEY	Salem, Mass.
Treasurer,	W. H. GODDARD	Louisville.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD	Louisville.
1st Vice-President,	GEO. J. FRIEDRICHS	New Orleans.
2d Vice-President,	E. T. DARBY	Philadelphia.
Recording Secretary,	GEO. H. CUSHING	Chicago.
Corresponding Secretary,	A. W. HARLAN	Chicago.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

NIAGARA FALLS, AUGUST, 1883.

President,	E. T. DARBY	Philadelphia.
1st Vice-President,	C. S. STOCKTON	Newark, N. J.
2d Vice-President,	T. T. MOORE	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING	Chicago.
Corresponding Secretary,	A. W. HARLAN	Chicago.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

SARATOGA SPRINGS, AUGUST, 1884.

President,	J. N. CROUSE	Chicago.
1st Vice-President,	M. W. FOSTER	Baltimore.
2d Vice-President,	C. F. RICH	Saratoga.
Recording Secretary,	GEO. H. CUSHING	Chicago.
Corresponding Secretary,	A. W. HARLAN	Chicago.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

MINNEAPOLIS, AUGUST, 1885.

President,	W. C. BARRETT	Buffalo, N. Y.
1st Vice-President,	L. C. INGERSOLL	Keokuk, Iowa.
2d Vice-President,	A. T. SMITH	Minneapolis, Minn.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

NIAGARA FALLS, 1886.

President,	W. W. ALLPORT	Chicago, Ill.
1st Vice-President,	GEO. W. MCELHANEY	Columbus, Ga.
2d Vice-President,	S. W. DENNIS	San Francisco, Cal.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN	Chicago, Ill.
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NIAGARA FALLS, 1887.

President,	FRANK ABBOTT	New York City.
1st Vice-President,	CHARLES R. BUTLER	Cleveland, Ohio.
2d Vice-President,	T. SOLLERS WATERS	Baltimore, Md.
Recording Secretary,	GEO. H. CUSHING	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY	Orange, N. J.
Treasurer,	GEO. W. KEELY	Oxford, Ohio.

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Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

SARATOGA SPRINGS, 1889.

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Treasurer,	A. H. FULLER . . .	St. Louis, Mo.

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J. N. CROUSE, Chairman. S. H. GUILFORD, Secretary.

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J. N. CROUSE, W. W. WALKER, *L. D SHEPARD.

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*A. O. HUNT, G. W. MCELHANEY, S. G. PERRY.

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* These go out August, 1890.

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MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION.

SESSION OF 1889.

BY GEORGE H. CUSHING, SECRETARY.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Twenty-ninth Annual Session in the Court Chambers at Saratoga Springs, N. Y., on Tuesday, August 6, 1889, at 11 A.M., the President, C. R. Butler, in the chair.

Prayer was offered by Rev. Dr. R. D. Harper, of Philadelphia.

The roll being called, the following were found either to be present or to have forwarded their dues:

ATKINSON, W. H.	41 East Ninth st., New York.
ABBOTT, FRANK	22 West Fortieth st., New York.
ALLPORT, W. W.	Argyle Building, Chicago, Ill.
AMES, W. B.	70 State st., Chicago, Ill.
* BÖDECKER, C. F. W.	60 East Fifty-eighth st., New York.
BROWN, S. B.	Fort Wayne, Ind.
BARRETT, W. C.	208 Franklin st., Buffalo, N. Y.
BUTLER, C. R.	519 Euclid ave., Cleveland, O.
* BAIRD, W. H.	Burlington, Iowa.
BOICE, ALONZO	1612 Vine st., Philadelphia, Pa.
BROPHY, TRUMAN W.	96 State st., Chicago, Ill.
* BALDWIN, A. E.	828 West Adams st., Chicago, Ill.
* BRACKETT, C. A.	102 Touro st., Newport, R. I.
* BARNES, HENRY	75 Kendall Building, Cleveland, O.
BISHOP, J. ADAMS	30 West Forty-eighth st., New York.

* Those marked thus were absent, but sent their dues.
d Those marked thus were delegate members.

BROWN, E. PARMLY	Flushing, Long Island, N. Y.
BOUTON, A. G.	126 Jones st., Savannah, Ga.
d BUDD, C. A.	Muncie, Ind.
* BOGUE, E. A.	29 East Twentieth st., New York.
CUSHING, GEO. H.	96 State st., Chicago, Ill.
CROUSE, J. N.	2231 Prairie ave., Chicago, Ill.
* CLIFTON, W. R.	Waco, Texas.
* CHAIM, M. L.	30 Cooper Institute, New York.
* CHITTENDEN, C. C.	21 West Main st., Madison, Wis.
COLGROVE, W. H.	41 Market st., Johnstown, N. Y.
* COOK, C. D.	133 Pacific st., Brooklyn, N. Y.
* COWIE, HENRY	Cor. Gratiot and Farrar sts., Detroit, Mich.
CURTIS, G. L.	11 East Jefferson st., Syracuse, N. Y.
* CLAPP, DWIGHT M.	62 Trinity Terrace, Boston, Mass.
* CONRAD, WILLIAM	321 North Grand ave , St. Louis, Mo.
* CLELAND, JAMES	152 Woodward ave., Detroit, Mich.
CUSTER, LEVITT E.	Dayton, Ohio.
COLDING, HENRY S.	105 Jones st., Savannah, Ga.
CRAVENS, J. E.	Indianapolis, Ind.
CLARK, F. Y.	Saratoga Springs, N. Y.
d COWAN, J. W.	106 Bank st , Geneseo, N. Y.
d CUMMINGS, J. E.	129 North Fayette st , Syracuse, N. Y.
DARBY, E. T.	1513 Walnut st., Philadelphia, Pa.
DOUGLASS, B.	Appleton, Wis.
* DOYLE, B. OSCAR	735 Jefferson st., Louisville, Ky.
* DICKINSON, W. P.	893 Main st., Dubuque, Iowa.
* DOWNS, E. D.	239 Front st., Owego, N. Y.
* DUNN, CHARLES E.	529 Second st , Louisville, Ky.
DWINELLE, W. H.	41 West Thirty-fourth st., New York.
* DUDLEY, ALBION M.	Salem, Mass.
* DAVENPORT, I. B.	30 Avenue de l'Opera, Paris, France.
FULLER, A. H.	2602 Locust st , St. Louis, Mo.
* FREEMAN, S. A.	641 Main st., Buffalo, N. Y.
* FUNDENBERG, W. H.	958 Penn ave., Pittsburg, Pa.
FIELD, GEORGE L.	Abstract Building, Detroit, Mich.
FOSTER, M. W.	9 West Franklin st., Baltimore, Md.
FILLEBROWN, THOMAS	Portland, Maine.
* FINLEY, M. F.	1928 I st , N. W., Washington, D C.
* FUNDENBERG, W. F.	958 Penn ave., Pittsburg, Pa.
FARRAR, J. N.	1271 Broadway, cor. 32d st., New York.
* FRIEDRICHS, GEO. J.	155 St. Charles st , New Orleans, La.
FREEMAN, S.	1109 Lexington ave., New York.
FREEMAN, ARTHUR B.	325 West Madison st., Chicago, Ill.
FINNEY, W. B.	77 North Eutaw st., Baltimore, Md.
FERNANDEZ, E. M. S.	103 State street, Chicago, Ill.
GUILFORD, S. H.	1616 Walnut st., Philadelphia, Pa.
GAYLORD, E. S.	682 Chapel St., New Haven, Conn.
* GILMER, T. L.	3266 Cottage Grove ave , Chicago, Ill.

GRAVES, CHARLES E.	715 North Forty-first st., Philadelphia, Pa.
GORGAS, F. J. S.	845 North Eutaw st., Baltimore, Md.
GILPIN, T. H.	Middletown, Del.
HOYSRADT, G. W.	Ithaca, N. Y.
*HOLMES, E. S.	103 Ottawa st., Grand Rapids, Mich.
HARLAN, A. W.	70 Dearborn st., Chicago, Ill.
HOW, W. STORER	Chestnut st , cor. 12th, Philadelphia, Pa.
HUNT, A. O.	Iowa City, Iowa.
HORTON, W. P.	177 Euclid ave., Cleveland, Ohio.
*HAYWARD, T. T.	2017 Fourth ave., Minneapolis, Minn.
*HACKER, T. S.	28½ East Ohio st., Indianapolis, Ind.
HOFF, N. S.	Ann Arbor, Mich.
*HAWES, EARL P.	88 Westminster st., Providence, R. I.
HERTZ, WALTER W.	3 West Third st., Williamsport, Pa.
INGERSOLL, L. C.	Keokuk, Iowa.
JACKSON, V. H.	6 East One Hundred and Twenty-sixth st., New York.
JEFFERIS, C. R.	908 King st., Wilmington, Del.
*JOHNSON, C. N.	Room 612, Opera House, Chicago, Ill.
*JACKSON, H. H.	317 Jefferson ave., Detroit, Mich.
d JACK, LOUIS	Philadelphia, Pa.
*KEITH, H. H.	2732 Washington ave., St. Louis, Mo.
*KINGSBURY, C. A.	1119 Walnut st., Philadelphia, Pa.
*KNEPPER, G.	Wilson Block, Los Angeles, Cal.
*KNOWLES, SAMUEL E. . . .	118 Dupont st., cor. Post, San Francisco, Cal.
*KNAPP, J. ROLLO	103 Canal st., New Orleans, La.
*KELLEY, D. E.	Ashtabula, Ohio.
KEELY, CHAS. I.	Hamilton, Ohio.
KOCH, C. R. E.	3011 Indiana ave., Chicago, Ill.
d KIRK, S. T.	Kokomo, Ind.
*KEECH, E. P.	525 North Charles st., Baltimore, Md.
LEVY, FRED. A.	343 Main st., Orange, N. J.
*LITCH, WILBUR F.	1507 Walnut st., Philadelphia, Pa.
*LUDWIG, R. F.	125 State st., Chicago, Ill.
*LATHROP, JOSEPH	271 Woodward ave., Detroit, Mich.
LUCKEY, B. F.	Paterson, N. J.
LANIER, J. D.	Liberty st., Savannah, Ga.
d LEWIS, J. HALL	1309 F st., N. W., Washington, D. C.
d LEWIS, JAMES	Burlington, Vt.
*LEWIS, C. W.	445 North Clark st., Chicago, Ill.
*MENG, JOHN W.	Lexington, Mo.
*MAXWELL, F. S.	Steubenville, Ohio.
*MCCANDLESS, A. W.	118 West Third st., Davenport, Iowa.
*MCELHANEY, G. W.	1147½ Broad st., Columbus, Ga.
MCMANUS, JAMES	Hartford, Conn.
MCKELLOPS, H. J.	2630 Washington ave., St. Louis, Mo.
*MORRISON, WM. N.	1401 Washington ave., St. Louis, Mo.

*Maercklein, Robert	422 Milwaukee st., Milwaukee, Wis.
Marshall, John S.	Argyle Building, Chicago, Ill.
*Morgan, Henry W.	211 North High st., Nashville, Tenn.
Morgan, W. H.	211 North High st., Nashville, Tenn.
Moore, J. Hall	104 North Ninth st., Richmond, Va.
McQuillen, Daniel N.	1628 Chestnut st., Philadelphia, Pa.
Noble, H. B.	600 Thirteenth st., cor. F, Washington, D. C.
*Northrop, A. L.	57 West Forty-ninth st., New York.
*Newby, James B.	2640 Washington ave , St. Louis, Mo.
*Odell, Frank M.	37 West Thirty-first st., New York.
Ottofy, Louis	1228 Milwaukee ave., Chicago, Ill.
Perry, S. G.	46 West Thirty-seventh st , New York.
*Palmer, J. W.	Fitchburg, Mass.
Peirce, C. N.	1415 Walnut st., Philadelphia, Pa.
*Page, W. E.	Room 11, Studio Building, Boston, Mass.
Patterson, J. D	800 Main st., Kansas City, Mo.
*Patrick, John J. R.	Belleville, Ill.
*Palmer, Stewart B.	39½ Warren st., Syracuse, N. Y.
*Palmer, Edgar	La Crosse, Wis.
*Pruyn, Chas. P.	70 Dearborn st., Chicago, Ill.
Priest, A. N.	Utica, N. Y.
Palmer, James G.	New Brunswick, N. J.
d Pinney, Worthington	2 Saybrook Place, Newark, N. J.
*Peabody, Francis	Louisville, Ky.
Rhein, Meyer L.	104 East Fifty-eighth st., N. Y.
*Reid, J. G.	30 McCormick Block, Chicago, Ill.
*Roberts, Norman J.	Waukegan, Ill.
*Remington, F. A.	57 West Forty-ninth st., New York.
d Rust, E. R.	1330 New York ave., Washington, D. C.
*Smith, Eugene H.	283 Dartmouth st , Boston, Mass.
Smith, H. A.	128 Garfield Place, Cincinnati, O.
Shepard, L. D.	100 Boylston st., Boston, Mass.
Stockton, C. S.	15 Cedar st., Newark, N. J.
*Starr, Alfred R.	164 East Ninety-first st., New York.
*Straight, Milton B.	80 West Huron st., Buffalo, N. Y.
Shryock, W. W.	27 West Berry st., Fort Wayne, Ind.
Sudduth, W. Xavier	1725 Arch st., Philadelphia, Pa.
*Sibley, A. H.	800 North Sixteenth st., Philadelphia, Pa.
Swasey, J. A.	3003 Michigan ave., Chicago, Ill.
*Stevens, B. Q.	Hannibal, Mo.
*Smith, J. H.	New Haven, Conn.
Smith, P. T.	Denver, Colorado.
*Smith, A. T.	262 Bank of Minneapolis Building, Minneapolis, Minn.
Stewart, W. C.	85 Clinton ave., Albany, N. Y.
Smith, B. Holly	926 Madison ave., Baltimore, Md.
d Swift, G. H.	Manchester, Vt.

* TOLEDO, M. V.	118 East Eighteenth st., New York.
TAFT, J.	122 West Seventh st., Cincinnati, O.
TRUMAN, JAMES	3249 Chestnut st , West Philadelphia, Pa.
TALBOT, EUGENE S. . . .	125 State st., Chicago, Ill.
TIMME, C. A.	190 Hudson st , Hoboken, N. J.
* WADSWORTH, THEO. A. . .	159 West Thirty-fourth st., New York.
WHITE, SAMUEL A. . . .	130 Broughton st., Savannah, Ga.
* WILSON, I. P.	317 North Fourth st., Burlington, Iowa.
* WALTON, J. C.	Howell, Mich.
WATERS, T. S.	Baltimore, Md.
* WHITSLAR, F. S. . . .	Youngstown, Ohio.
* WHITSLAR, W. H. . . .	Youngstown, Ohio.
WINDER, R. B.	716 Park ave., Baltimore, Md.
* WATERS, GEO. F. . . .	6 Somerset st., Boston, Mass.
* WADSWORTH, E. CLIFFORD .	511 Bedford ave., Brooklyn, N. Y.
WARD, JOS. R. C. . . .	1905 Fairmount ave., Philadelphia, Pa.
* WENDEL, W. C. . . .	107 Wisconsin st., Milwaukee, Wis.
WATKINS, S. C. G. . . .	Mont Clair, N. J.
WARD, E. B.	3171 Groveland ave., Chicago, Ill.
WALKER, W. W. . . .	67 West Ninth st., New York.
WILLIAMS, JACOB L. . . .	1 Mount Vernon st., Boston, Mass.
d WATKINS, G. B. . . .	146 Woodward ave., Detroit, Mich.

Any inaccuracies in the above list, in name or location, should be reported to the Treasurer at once, in order that the necessary corrections may be made.

Annual dues being payable in advance, no name appears on above list except of those who have paid for 1889, and Transactions are not sent to any who have not fully paid their dues.

Dues must be paid to the Treasurer. Send draft, P. O. money order, or express order. *Never* send currency by mail.

A. H. FULLER, *Treasurer*,
2602 Locust st., St. Louis, Mo.

On motion, the reading of the printed minutes was dispensed with.

Under miscellaneous business, the Executive Committee reported the printed programme, amended to make the hour for the evening sessions 8 o'clock instead of 7.30, which was adopted.

The following was adopted:

Resolved, That the Secretary be instructed to request—in writing—all dental goods dealers and those having exhibits to close their doors *promptly* upon the opening of the daily sessions of the Association.

The Publication Committee read the following report:

The Publication Committee would respectfully report that the Transactions of the Joint Session of the American and Southern Dental Associations were published by The S. S White Dental Manufacturing Co., as they have heretofore published those of the American Dental Association.

Mr. Hise is again entitled to thanks for his care and promptitude, which enabled the Committee to mail the Transactions February 12. As the meeting was held nearly a month later than usual and the matter was so much greater, the time of mailing compares favorably with the best of former years.

Fifty extra copies were issued under the impression that a number would be wanted by members of the Southern Association, and the price was fixed at $1.25, but none have thus far been sold.

A copy of the Transactions of the Ninth International Medical Congress has been received.

RECEIPTS AND EXPENDITURES.

Received from Treasurer	$100.00	
" " Sale of Transactions	16.25	
		$116.25
Expended for expressage, paper, and copying	$14.15	
" " printing (Knight & Leonard Co.)	7.00	
" " engrossing memorial (H. Heath)	8.00	
" " stationery, telegrams, and postage	17.40	
" " books for Treasurer and Secretary and blank orders (Marshall & Co.)	14.00	
" " S. S. White Dental Manufacturing Co.'s bill for binding, mailing, and postage	72.32	
		$132.87
Balance due the Committee		16.62

GEO. H. CUSHING, *Chairman.*

Audited and approved August 6, 1889.

A. O. HUNT,
S. G. PERRY,
Auditing Committee.

The Credentials Committee made a partial report, which was subsequently completed as follows:

American Academy of Dental Science—Jacob L. Williams.
Baltimore College of Dental Surgery—W. B. Finney, B. Holly Smith, R. B. Winder.
Chicago Dental Society—J. N. Crouse, E. B. Ward
Chicago Dental Club—Arthur B. Freeman.
Colorado State Dental Association—P. T. Smith.
Delaware State Dental Society—T. H. Gilpin.
Georgia State Dental Society—J D. Lanier, Henry S. Colding, A. G. Bouton.
Hayden Dental Society of Chicago—Louis Ottofy.
Illinois State Dental Society—Louis Ottofy, C. R. E. Koch, W. B. Ames, James A. Swasey.
Indiana Dental Society—S. T. Kirk, S. B. Brown, C. Allen Budd.
Iowa State University, Dental Department—A. O. Hunt.
Kansas City Dental College—J. D. Patterson.

Maryland University, Dental Department—F. J. S. Gorgas.
Michigan State Dental Society—G. B. Watkins.
Missouri Dental College—A. H. Fuller.
New Jersey State Dental Society—Worthington Pinney.
New York First District Dental Society—Solomon Freeman.
New York Fifth District Dental Society—J. E. Cummings.
New York Seventh District Dental Society—J. W. Cowan.
New York State Dental Association—W. H. Dwinelle.
Odontological Society of Pennsylvania—W. Xavier Sudduth, C. R. Jefferis, Louis Jack, D. N. McQuillen.
Odontological Society of Chicago—Geo. H. Cushing, A. W. Harlan.
Ohio State Dental Society—L. E. Custer.
Pennsylvania College of Dental Surgery—C. N. Peirce.
Philadelphia County Dental Society—Jos. R. C. Ward, Chas. E. Graves.
University Dental College of Chicago—John S. Marshall.
University of Michigan, Dental Department—N. S. Hoff.
Vermont State Dental Society—G. H. Swift, James Lewis.
Virginia State Dental Association—J. Hall Moore.
Washington City Dental Society—H. B. Noble, J. Hall Lewis, E. R. Rust.

The amendments to the Constitution proposed last year, as follows, were then taken up.

To amend Section 2 of Article III by substituting the following:

"SEC. 2. Members losing connection with local societies.

"Any permanent member of this Association losing his membership in his local dental society from any cause shall from that date cease to be a member of this Association."

On motion, it was indefinitely postponed.

To amend Section 5, Article III, by adding at the close of the first sentence, after the words permanent membership, the words, "and who shall continue in the active practice of dentistry."

On motion, this was also indefinitely postponed.

The Credentials Committee here made a supplemental report.

The Treasurer then read his report, as follows:

SARATOGA SPRINGS, August 6, 1889.

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH A. H. FULLER, TREASURER.

Received from the estate of Geo. W. Keely	$1673.18
" " dues to date	1065 00
Total received	$2738.18

Brought forward		$2738.18

DISBURSED.

A. W. Harlan, postage, printing, etc.	$98.00	
H. A. Smith, printing, Section VI	6.00	
Geo. H. Cushing, Recording Secretary, salary	200.00	
Geo. H. Cushing, Reporter's salary	125.00	
Louis Ottofy, printing	7.00	
Louis Ottofy, printing and postage	7.10	
Balance paid Publication Committee	11.85	
Balance paid on account joint session	44.63	
Geo. H. Cushing, Chairman Publication Committee, to pay S. S. White Dental Mfg. Co.'s bill for printing and postage, and incidentals	100.00	
A. H. Fuller, express, printing, postage, etc.	15.05	
Estate Geo. W. Keely, Treasurer's salary	100.00	
		$709.63
Balance on hand		$2028.55

Audited and approved August 6, 1889.

A. O. HUNT,
S. G. PERRY,
Auditing Committee.

The resignations of Drs. C. F. W. Bödecker, Wm. Carr, and J. H. Martindale were accepted.

The Credentials Committee made a further partial report.

The Committee on Directory appointed last year reported that they had been able thus far to do nothing.

The President here called Dr. W. H. Atkinson to the chair, and then read his address.

Under miscellaneous business, the Treasurer was authorized to pay all properly authenticated bills.

Dr. McKellops called for the reading of resolutions presented by him at Boston condemning the indorsement of amalgams or nostrums, and then read a circular advertisement of Dr. Register's alloy, with the names of several prominent men as indorsing the same, many of whom thereupon disclaimed authorizing the use of their names.

The places of meeting of the various Sections were then announced, and the Association adjourned till 8 P.M.

FIRST DAY—EVENING SESSION.

The Association was called to order at 8.30 P.M., President Butler in the chair.

The minutes of the morning session were read and approved.

Under miscellaneous business, Dr. McKellops moved that H. H. Mudd, M.D., of St. Louis, and J. Ward Hall, of Shanghai, be invited to take part in our discussions.

Carried.

The Credentials Committee made a further supplemental report.

Under the regular order, Section IV was called, and Dr. Frank Abbott, the Chairman, read a paper on "Growth of Enamel," prefacing its reading by expressing his thanks to Dr. Carl Heitzmann, of New York, for his kindness in making the drawings and assisting in the preparation of the specimens and of the paper.

Discussed by Drs. Atkinson and Sudduth.

Under miscellaneous business, on motion of Dr. Allport, the following was adopted:

Resolved, That anything said or action taken by this Association in regard to delegates to attend the Dental Congress to be held in Paris in September, or in regard to suggestions or recommendations of an International Dental Congress in this country at a future time, be made the special order for 12 o'clock M. to-morrow, Wednesday.

Dr. Hall, of Shanghai, on invitation then addressed the Association with reference to the practice of dentistry in China and the East.

Dr. Morgan made some remarks on Japan and the Methodist Episcopal Church there, and also regarding the approaching meeting of the American Medical Association to be held at Nashville in May, 1890.

Upon the recommendation of the Executive Committee, to-morrow evening was set apart for the consideration of Sections IV and VII, and the hour of 11 A.M. to-morrow for hearing from the lawyer of the Protective Association.

The Credentials Committee made a further partial report, when the Association adjourned to meet at 9 A.M. Wednesday.

SECOND DAY—MORNING SESSION.

The Association was called to order at 9.45 o'clock, President Butler in the chair.

The minutes of last evening's session were read and approved.

Under miscellaneous business, the President appointed as Committee on Memorial on the death of Dr. Rehwinkel, Drs. Taft, Abbott, and W. H. Morgan.

In regular order, Section V being called, Dr. Harlan, the Chairman, read the report.

Discussed by Drs. Barrett, Horton, Harlan, and Atkinson.

Section VI was then called, and Dr. H. A. Smith reported the following papers to be read: One on "Implantation," by the Chairman; one by Dr. Talbot on "Classification of Typical Cases of Irregularities of the Teeth and Maxillæ," and one by Dr. Ottofy presenting the subject of the tabulating of pre-historic skulls.

Dr. H. A. Smith then read his paper, and was followed by Dr. Talbot, who presented his paper, illustrated by diagrams and casts. At the close of his reading, the hour for hearing from Dr. Crouse and the attorney of the Protective Association having arrived, Dr. Crouse took the floor and briefly presented the subject; he was followed by Mr. Officld, who stated the legal aspects of the case.

Dr. Horton rose to a question of privilege, explaining his action in opposing the appropriation of money to defend suits,—in Niagara two years ago,—saying he was fully in accord with the present aims of the Dental Protective Association.

The hour, 12 o'clock, fixed for the special order, to consider the sending of delegates to the Paris International Dental Congress, having arrived, Dr. Cushing moved to pass the subject.

The motion prevailed.

The regular order being resumed, discussion was continued by Drs. Barrett and Curtis.

Dr. Ottofy then presented the subject of the proposed examination and tabulation of pre-historic crania.

Dr. McKellops moved that a committee of five be appointed to act in concert with the Illinois State Dental Society in the matter of the examination and tabulation of pre-historic crania.

Dr. H. A. Smith moved to amend by adding, that five hundred dollars be appropriated for the purpose.

The time for organization of Sections having arrived, on motion of Dr. McKellops the hour was postponed for five minutes. Dr. Barrett then moved to amend Dr. McKellops's motion as amended by Dr. Smith, by making Section VI the committee to co-operate with the Illinois State Dental Society.

It was again moved to extend time for special order five minutes.

Carried.

The question was then put on Dr. Barrett's motion to amend, which was carried, and then put upon Dr. Smith's motion to amend, which also was carried, and finally the question upon the original motion as amended was put and carried, so that the motion adopted reads as follows:

"Moved that Section VI of this Association be constituted a committee to act in concert with the Illinois State Dental Society in the matter of the examination and tabulation of pre-historic crania, and that the sum of five hundred dollars be appropriated from the treasury for this purpose."

The following telegram from the American Dental Society of Europe was read, and the Secretary instructed to send congratulatory return message:

PARIS, August, 1889.

AMERICAN DENTAL ASSOCIATION,
SARATOGA SPRINGS, N. Y.

The American Dental Society of Europe, in session, send fraternal greetings.

THE AMERICAN DENTAL SOCIETY OF EUROPE.
PATTON, *Secretary*, Hotel Chatham.

Sections were then organized, and organization was subsequently completed as follows:

SECTION I. Prosthetic Dentistry, Chemistry, and Metallurgy.—E. S. Gaylord, chairman; W. B. Ames, secretary; E. P. Brown, G. L. Curtis, H. B. Noble, S A. Freeman, Alonzo Boice, J. E. Cravens, J. N. Farrar, M. L. Chaim, M. B.

Straight, John Allen, V. H. Jackson, J. Rollo Knapp, Jos. R. C. Ward, T. S. Waters, H. H. Keith, E. H. Allen, J. B. Alexander, J. T. Abbott, S. B. Brown, J. Adams Bishop, David E. Barrows, D. C. Bacon, C. Bullock, Ira Brown, A. E. Baldwin, M. L. S Buckner, Joseph Bauer, C. S. Case, M. H. Dailey, Chas. E. Dunn, E. G. Douglass, E. D. Downs, B. Douglass, W. H. Dwinelle, A. W. Freeman, Geo. L. Field, M. W. Foster, E. M. S. Fernandez, W. B. Finney, A. E. Griggs, F. H. Gardiner, C. B. Gunn, E. L. Graves.

SECTION II. Dental Education, Literature, and Nomenclature.—C. N. Peirce, chairman; Louis Ottofy, secretary; J. N. Crouse, C. S. Stockton, S. H. Guilford, Jacob L. Williams, J Taft, J. S. Marshall, A. O. Hunt, W. W. Allport, Edgar Palmer, C. R. E. Koch, B. Holly Smith, Geo. J. Friedrichs, J. N. Farrar, E. S. Holmes, Chas. D. Cook, Fred. A. Levy, E. P. Keech, C. R. Jefferis, L. C. Ingersoll, Edmund Noyes, F. J. S. Gorgas, E. H. Allen, S. B. Brown, J. Adams Bishop, Henry Cowie, John V. Cole, M. L. Chaim, James Cleland, C. C. Chittenden, C. S. Case, Chas. E. Graves, T. H. Gilpin, F. O. Hetrick, O. N. Heise, T. S. Hacker, R. F. Horne, S. J. Hill, H. H. Jackson, James G. Palmer.

SECTION III. Operative Dentistry.—E. T. Darby, chairman; N. S Hoff, secretary; C. N. Peirce, S. C. G. Watkins, G. W. Hoysradt, W. H. Colgrove, A. H. Fuller, J. Hall Moore, C. R. Butler, W. H. Morgan, W. W. Hertz, S. Freeman, E. P. Brown, A. N. Priest, J. D. Lanier, C. N. Johnson, A. W. McCandless, F. S. Maxwell, E. J. Perry, M. V. Toledo, W. E. Page, Jno. W. Meng, S. B. Palmer, S. G. Perry, C. H. Harroun, B. F. Luckey, M. F. Finley, Alonzo Boice, Thos. Fillebrown, R. B. Winder, R. F. Ludwig, W. N. Morrison, S. G. Stevens, M. B. Straight, Wm. Conrad, E. P. Hawes, A. H. Brockway, Dwight M. Clapp, Henry Barnes, W. P. Dickinson, S. E. Knowles, V. H. Jackson, E. C. Wadsworth, W. W. Shryock, J. Rollo Knapp, E. D. Swain, Chas. P. Pruyn, G. S. Salomon, W. R. Clifton, C. P. Southwell, W. H. Buckley, B. Oscar Doyle, E. Honsinger, W. F. Fundenberg, W. H. Fundenberg, H. W. Morgan, Jos. R. C. Ward, Jas. McManus, Eugene H. Smith, Chas. C. Barker, G. W. McElhaney, A. E. Brown, Edmund Noyes, W. H. Baird, B. Q. Stevens, Daniel Neal McQuillen, Saml. A. White, P. G. C. Hunt, C. A. Kingsbury, C. I. Keely, G. Knepper, D. E. Kelley, T. C. Leiter, Jos. Lathrop, C. W. Lewis, B. G. Maercklein, Thos. T. Moore, E. W. Munn, W. J. Martin, Robt. Maercklein, Geo. W. Melotte, J. Hall Moore, A. L. Northrop, Jas. B. Newby, E. D. Nickson, Chas. H. Osgood, J. J. R. Patrick, Jas. G. Palmer, W. C. Proctor, C. J. Peterson, T. H. Gilpin, B. Douglass.

SECTION IV. Histology and Microscopy.—W. H. Atkinson, chairman; W. Xavier Sudduth, secretary; T. L. Gilmer, Frank Abbott, J. E. Cravens, I. P. Wilson, H. W. Morgan, L. L Davis, J. W. Rhone, F. A. Remington, L. D. Shepard, S. G. Stevens.

SECTION V. Materia Medica and Therapeutics.—A. W. Harlan, chairman; James Truman, secretary; G. W. Hoysradt, W. C. Stewart, T. T. Hayward, C. A. Brackett, W. W. Walker, Wilbur F. Litch, J. W. Palmer, A. R Starr, W. M. Shirley, A. G. Bouton, Geo. H. Cushing, A. M. Dudley, C. B. Rohland, J. G. Reid, F. R. Ross, Jas. A. Swasey, A. T. Smith, A. H. Sibley, M. E. Smith, J. H. Smith, G. R. Thomas, W. E. Tucker, Jas. I. Taylor, W. H. Taggart, C. A.

Timme, W. C. Wendel, Theo. A. Wadsworth, J. C. Walton, J. W. Wassall, W. H. Whitslar, T. E. Weeks, F. S. Whitslar, E. B. Ward, W. J. Martin.

SECTION VI. Physiology and Etiology.—H. A. Smith, chairman; W. S. How, secretary; H. J. McKellops, W. P. Horton, E. S. Talbot, W. Xavier Sudduth, L. E. Custer, W. C. Barrett, A. H. Thompson, Louis Ottofy, G. F. Waters, W. C. Wardlaw, A. Wilkes Smith, P. T. Smith, Frank M. Odell, J. D. Patterson.

SECTION VII. Anatomy, Pathology, and Surgery.—J. S. Marshall, chairman; M. L. Rhein, secretary; W. C. Barrett, G. L. Curtis, W. Xavier Sudduth, A. B. Freeman, Jacob L. Williams, W. W. Allport, T. W. Brophy, Sol. Freeman, J. D. Lanier, H. S. Colding, M. G. Jenison, N. J. Roberts, W. P. Dickinson, S. E. Knowles, I. P. Wilson, Isaac B. Davenport, E. B. Ward.

Association then adjourned till 3 P.M.

SECOND DAY—AFTERNOON SESSION.

The Association was called to order at 3.40 P.M., the President in the chair.

The minutes of the morning session were read and approved.

Under the head of miscellaneous business, on motion of Dr. Allport, the following was adopted as a standing resolution:

WHEREAS, The National Association of Dental Faculties has passed a resolution adopting a three years' course of instruction after matriculation as essential to graduation, therefore

Resolved, That in the future no dental college shall be represented in this Association that does not comply with the course of instruction adopted by the college association named.

Under the regular order, the subject of irregularities was continued by Drs. P. T. Smith and Talbot.

The Credentials Committee made a further partial report.

Dr. H. A. Smith's paper on implantation was discussed by Drs. Horton, S. C. G. Watkins, Marshall, H. A. Smith, Peirce, G. L. Curtis, P. T. Smith, Barrett, Patterson, Rhein, Ottofy, and closed by H. A. Smith.

Section VII being called, the Chairman, Dr. Brophy, read a paper on "Lesions of the Dental Branch of the Fifth Pair of Nerves."

Discussed by Drs. Rhein, Marshall, and Brophy.

Section I being called, a communication from the Secretary, Dr. Ames, was read, stating that nothing had been presented from the Chairman or from any member up to the present time.

Section II was called, and the report was read by the Secretary, Dr. Ottofy.

Dr. Marshall explained that the reason the University Dental College of Chicago had dropped from its standard of three years to two years was because they could not afford to do otherwise.

Dr. W. H. Atkinson read a paper by Chas. B. Atkinson, of New York, entitled "Some Thoughts on Education."

Under miscellaneous business, the Secretary reported that the following had been forwarded by cable, as per instructions:

SARATOGA, N. Y., August 7, 1889.

The American Dental Association reciprocates kindly greetings of the American Dental Society of Europe.

(Signed) CUSHING, *Secretary*.

To PATTON, *Secretary*, Hotel Chatham, Paris.

Association adjourned to 8 P.M.

SECOND DAY—EVENING SESSION.

The Association was called to order at 8.30 P.M., the President in the chair.

The minutes of the afternoon session were read and approved.

There being no miscellaneous business, a paper entitled "Oral Surgery and Who should Perform It," by Dr. Jenison, of Minneapolis, was read by the Secretary, when the special order for the evening, the consideration of the subjects of Sections IV and VII, was announced, and Dr. Sudduth delivered his lecture illustrated by micro-photographs thrown upon a screen.

At the close of Dr. Sudduth's exhibition, the Association adjourned till 9 A.M. to-morrow.

THIRD DAY—MORNING SESSION.

The Association was called to order at 9.45 A.M., the President in the chair.

The minutes of last evening's session were read and approved.

Under the head of miscellaneous business, the following, offered by Dr. Cushing, was adopted:

WHEREAS, The meetings of the National Association of Dental Faculties and of the National Association of Dental Examiners, when held during the sessions of this Association, deprive the members of those bodies of the opportunity to take part in our proceedings and this Association of the benefit of their presence and advice, therefore

Resolved, That this Association earnestly request the two bodies above named to fix the dates of their meetings in the future for the Saturday preceding the meeting of this Association, or at such other time as may enable them to complete their business before the opening of the session of the American Dental Association.

On motion of Dr. Rhein, the following was adopted:

Resolved, That a committee of two be appointed to wait on the Association of Dental Faculties and the Association of Dental Examiners, and request them to adjourn temporarily, as there are so few members present at this meeting; and that we await their action before proceeding with business.

The Chair appointed Drs. McKellops and Gaylord as the committee to wait on the Associations named, who returned the following communication:

PRESIDENT AMERICAN DENTAL ASSOCIATION:

The National Association of Faculties now in session acknowledge receipt of your special communication of this date, and desire to inform your body that they will adjourn as soon as possible.

A. O. HUNT, *President.*

Dr. Rhein rose to a question of privilege, to state that he had a paper which he would be very glad to read if the Association desired it.

Dr. McKellops moved that Dr. Rhein be permitted to read the paper referred to.

Discussed by Drs. Barrett, Allport, and Rhein. The motion being put *viva voce*, was decided lost. The yeas and nays being called for, three voted for the reading and twenty-five against.

In regular order, Sections IV and VII being under discussion, on motion both Sections were passed.

Section II being again called, Dr. Louis Jack read a paper on "Independent Journalism."

Discussed by Drs. Barrett and Crouse.

Section II offered the following:

Resolved, That Section II be instructed to formulate and present at the next meeting of this Association a plan of work for the Sections of the Association.

After discussion by Drs. Crouse, Barrett, Shepard, and Allport, it was adopted.

Dental Education was further discussed by Dr. Ottofy and then passed.

Section III being called, its report was read by the Secretary, Dr. Hoff.

A paper by Dr. Head was then read by the Secretary.

Dr. Shepard here moved a suspension of the regular order, which being carried, he moved that the Publication Committee be instructed not to publish the paper by Dr. Head, as he is not a member of this Association.

Carried.

The regular order being resumed, Dr. V. H. Jackson read a paper entitled "Some Methods of Regulating Teeth."

Dr. G. B. Watkins, of Detroit, presented a practical case of regulating.

Dr. G. L. Curtis read a paper by Wilhelm Herbst, of Bremen, Germany, on "Glass Fillings."

Discussed by Drs. Barrett and Hunt.

Under miscellaneous business, the following, offered by Dr. Marshall, was laid on the table:

Resolved, That hereafter Chairmen of Sections shall send to the Chairman of the Committee of Arrangements, at least thirty days before the meeting of the

Association, a list of the titles of papers that are offered to be read before this Association, and that as far as possible such lists be published in the printed programme.

The following communication from the National Association of Faculties was read:

DR. CUSHING, *Secretary American Dental Association:*

The National Association of Dental Faculties adopted this date the appended resolution, additional to a former communication of this date.

A. O. HUNT, *President.*
J. E. CRAVENS, *Secretary.*

Resolved, That in answer to the communication of the American Dental Association we beg leave to request of that body that they will omit the afternoon sessions at future meetings, to allow time for transaction of the business of other important bodies convening at the same time.

Dr. Crouse offered the following:

Resolved, That the Chairman and Secretary of the National Association of Dental Faculties and of the National Association of Dental Examiners be requested to communicate with the Chairman of the Committee of Arrangements at least two months before the meeting of this Association, to arrange for a harmonious meeting of the three Associations, so that their sessions may not conflict with one another.

Adjourned till 3 P.M.

THIRD DAY—AFTERNOON SESSION.

The Association was called to order at 4 P.M., the President in the chair.

Under miscellaneous business, the Credentials Committee made a further supplemental report.

Dr. Crouse's resolution being under consideration, was discussed by Drs. Barrett, Cushing, Marshall, McKellops, Truman, Crouse, Cravens, H. A. Smith, and J. Taft.

On motion, it was laid on the table.

Dr. Ottofy offered the following, seconded by Dr. McKellops:

In view of the injustice which the profession has sustained in the past, as well as the annoyances to which it may be subjected in the future, and fully appreciating the arduous and important labors of Dr. J. N. Crouse, of Chicago, be it

Resolved, That Dr. Crouse is entitled to the earnest and practical support of every dentist in the United States; and further be it

Resolved, That the American Dental Association fully approves of the formation, the plans, and methods of the Dental Protective Association of the United States, and pledge to it our united and continued support and moral aid.

Carried.

The regular order being called, Section III, Operative Dentistry, was discussed by Drs. Harlan, Patterson, Ward of Philadelphia, Hoff, McKellops, White of Savannah, Crouse, Barrett, W. H. Morgan, Truman, Taft, and Dwinelle.

The hour for adjournment having arrived, on motion it was voted that the subject now under discussion be resumed this evening.

The following communication was read:

To the American Dental Association:

On motion, it was resolved that the Secretary of the National Association of Dental Examiners be instructed to request the American Dental Association to omit afternoon sessions at its meetings hereafter.

August 8, 1889. Fred. A. Levy, *Secretary*.

The Association adjourned till 8 p.m.

THIRD DAY—EVENING SESSION.

The Association was called to order at 8.35, the President in the chair.

The minutes of the afternoon session were read and approved.

There being no miscellaneous business, the regular order was resumed and discussed by Drs. Allport, Taft, Dwinelle, Sudduth, Marshall, P. T. Smith, Clark, and Barrett.

On motion, Dr. Dwinelle was invited to the privileges of the floor.

Under miscellaneous business, the following, introduced by Dr. Marshall, was unanimously adopted:

Resolved, That this Association pledges itself in the sum of one thousand dollars ($1000), if needed, to assist Dr. J N. Crouse in defending himself against the civil suit for damages brought against him by the International Tooth Crown Company on account of his efforts to protect the dentists of America against the injustice of the demands of said company.

The Credentials Committee made a further partial report, and the Association adjourned to meet at 9 A.M. to-morrow.

FOURTH DAY—MORNING SESSION.

The Association was called to order at 9.30, the President in the chair.

The minutes of last evening's session were read and approved.

Under miscellaneous business, the following, offered by Dr. Peirce, was adopted:

Resolved, That the Executive Committee be and are hereby instructed to authorize the Treasurer to honor the drafts of Dr. J. N. Crouse for a sum not exceeding one thousand dollars,—which has already been appropriated,—to be used solely for defense in the civil suits against him on account of his connection with the Dental Protective Association.

On motion of Dr. Marshall, the following was adopted as a standing resolution:

Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in this Association without the payment of dues; and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

The Committee on the death of Dr. Rehwinkel made their report, which will be found on the memorial page.

Dr. Cravens offered the following:

Moved, that so much of the remarks of Dr. P. T. Smith, of Denver, as reflected upon the profession and State of Indiana be stricken from the report of the Transactions as unprofessional.

After some discussion, it was indefinitely postponed.

Dr. Shepard offered the following as a standing resolution:

Resolved, That the Publication Committee be instructed to omit from the Transactions papers and remarks in discussion written or made by those not members in good standing of this Association or such non-members as have not been given the privileges of the floor.

After discussion, it was indefinitely postponed.

On motion of Dr. Ottofy, the following were adopted:

Resolved, That we tender our thanks to those railroads that have extended courtesies to our members for reduced rates to Saratoga, and

Resolved, That our special thanks are due to Dr. A. C. Rich, of Saratoga, for his untiring attention to the wants of this Association during our sojourn here.

Section VI reported the following committee to take charge of the work of examining and tabulating pre-historic crania authorized by the Association: H. A. Smith, H. J. McKellops, W. C. Barrett, Louis Ottofy, W. X. Sudduth.

On motion, the regular order was taken up, and Section III was called.

On motion, it was passed.

Section I, being again called, presented a method of movable bridgework by Dr. G. L. Curtis, and one explained by Dr. R. B. Winder, made by Dr. Spencer, of Virginia.

Dr. Curtis then explained his method.

At 10.30 A.M. it was, on motion, decided to proceed to the selection of place of next meeting and the election of officers.

The Executive Committee nominated Excelsior Springs, Missouri (near Kansas City), and Boston.

Long Branch and Detroit were also nominated.

Excelsior Springs was chosen on the first ballot.

The Association then proceeded to the election of officers.

On the first ballot for President A. W. Harlan received thirty-six votes and M. W. Foster thirty-two. This being declared an informal ballot, a formal ballot was taken, when it was found that A. W. Harlan had received thirty-one votes and M. W. Foster thirty-six. The officers chosen were as follows:

President—M. W. Foster, of Baltimore.
First Vice-President—A. W. Harlan, of Chicago.
Second Vice-President—J. D. Patterson, of Kansas City.
Recording Secretary—Geo. H. Cushing, of Chicago.
Corresponding Secretary—Fred. A. Levy, of Orange, N. J.
Treasurer—A. H. Fuller, of St. Louis.
Executive Committee—S. H. Guilford, S. G. Perry, and W. W. Walker.

By unanimous consent, the following amendment to the Constitution, proposed by Dr. Cushing, was adopted:

To amend Article III, Section 5, of the Constitution, by striking out the word "signify," and inserting in its place the following words: "sign a statement in a book to be kept for that purpose, signifying," making the first sentence in Article III, Section 5, read as follows:

"SEC. 5. *Permanent Members.*—Permanent members shall consist of those who, having served one year as delegates, and complied with the requirements of the Association, shall sign a statement in a book to be kept for that purpose, signifying to the Treasurer a desire for permanent membership."

The following report of the Auditing Committee was adopted:

SARATOGA, August 9, 1889.

We would report that the reports of the Secretary and Treasurer have been duly audited and approved.

A. O. HUNT,
S. G. PERRY,
Auditing Committee.

Dr. Allport moved that the Association suggest to the officers a change of time of meeting for next year, so as not to conflict with the International Medical Congress which meets in Berlin at about the time for the meeting of this Association.

Carried.

The minutes were here read and approved.

The President then appointed Drs. Harlan and Perry to conduct the newly-elected President to the chair, who, upon being introduced, briefly thanked the Association for the honor conferred.

The new President appointed on the Publication Committee Drs. Marshall and Barrett, and on the local Committee of Arrangements Drs. J. D. Patterson, of Kansas City; John W. Meng, of Lexington, Mo., and C. B. Hewitt, of Kansas City.

Drs. Stockton and Curtis were appointed to escort the newly-elected Vice-Presidents to their seats. After they were installed, the minutes were read and approved and the Association adjourned, to meet at Excelsior Springs the first Tuesday in August, 1890.

GEORGE H. CUSHING, *Secretary.*

IN MEMORIAM.

WHEREAS, It has pleased the allwise Ruler of the universe to remove from this life our friend and co-worker, Dr. F. H. Rehwinkel; therefore, be it

Resolved, That in the death of Dr. Rehwinkel this Association and the profession at large have sustained an irreparable loss.

Resolved, That as a friend and professional brother he was always most kind and faithful, and an earnest and honest worker.

Resolved, That to his bereaved family and friends we extend our heartfelt sympathy and condolence in their great affliction.

Resolved, That a copy of these resolutions, properly engrossed, be sent by the Secretary of this Association to the family of our deceased brother, and that they be published in full in the memorial page of the Transactions.

ANNUAL ADDRESS.

By CHARLES R. BUTLER, President.

IN the interchange of fraternal salutations upon reassembling in this attractive and historic place to hold our twenty-ninth annual meeting, let us with befitting reverence turn our thoughts with gratitude to the one All-Wise and Beneficent, through whose protection so many of our number are permitted to engage again in earnest work for the advancement of the profession.

But while exchanging congratulations we must sadly pause to pay the tribute of respect to those who have fallen victims to the never-failing arrow of the grim archer during the past year.

In the death of Dr. Frederick H. Rehwinkel, of Chillicothe, Ohio, —a former President of this Association,—which occurred June 8, 1889, a bright light in our profession was extinguished. He will long be remembered for his many high qualities and as a most courteous gentleman and sincere friend.

Dr. Flavius Searle, of Springfield, Mass.; Dr. J. Q. Dickerman, of Taunton, Mass., and Dr. Leon Rideout, of Lynn, Mass., former members, have also passed away, leaving records worthy of emulation.

In the exercise of my prerogative on this occasion, I do not propose any review of the progress that has been made in the profession during the year. All this you will learn from the reports of the Sections, and will doubtless find that we have not been standing still. Neither do I purpose to attempt to advise or suggest to this body what they should do, but I desire to speak of the early helps in professional life which I enjoyed and of some of the true men I have known.

There is a popular place of amusement in London where as you enter one of the rooms you seem to be surrounded by ladies and gentlemen. Their dress, graceful pose, and general appearance are such that you are surprised upon close inspection to find they are wax, only wax!

So, too, there are men who seem to command general admiration

when clothed upon with noble ancestry, royal and stately honors, fine scholarship, great wealth, and fine intellect; but the true man is something much more than this. It is no compliment to a person who only *claims* to be a dentist to be called doctor, neither does an honorary degree make him so legally.

The true man must bear the closer scrutiny that reveals to you that he is something more than wax. It is of such that I would speak, in the hope that more may be developed in the future who may make easier the pathway of young and struggling practitioners, as mine was eased.

Early in my student days Dr. W. H. Ambler, of Cleveland, was the first to show me how to put a gold filling in a tooth. He was not afraid to let a young man see how he did it.

Dr. Elisha Townsend, of Philadelphia, while examining a number of gold fillings that I had put in, in the old Pennsylvania College, referred to them with kindly and complimentary remarks which made a lasting impression upon me, stimulating me thereafter to put my best efforts into what I had to do, that I might be worthy of the commendation of such men.

Dr. J. H. McQuillen, too, showed me many kindnesses during the same winter, and remained a warm friend throughout his life.

In 1858, at the suggestion of Dr. Atkinson, I operated for Dr. Blakeslee, of Utica, N. Y., a venerable man and having a high reputation as an operator. Upon examining the completed work, he commended it in such a kindly manner that, coming from such a man, I felt it to be a benediction, and was again strengthened for the battle of life. As years rolled on I received help and encouragement from such men as Corydon Palmer, Louis Jack, J. A. Robinson, W. H. Allen,—a polished gentleman and warm friend,—W. W. Allport, H. J. McKellops, J. Taft, and many others.

This all occurred before the days when the student could get access to the operating-rooms of the most skillful, or have the advantage of the magnificent clinics which are now so frequently given in almost every part of the country, at which the best operators in the world show the finest things known to the art of dentistry, and where more can be seen and learned in two or three days than could have been acquired in ten years some thirty or more years ago.

Among those whom I cherish as my helpers, Samuel S. White comes before me as a pleasing vision. Endowed as he was with true manhood and with a wonderful faculty of helping men to help themselves, he always aided me by his counsel and warm friendship.

Time is carrying us onward at a rapid pace, and we shall soon come to the end of our work here. It seems to me to be our duty to speak encouragingly to the young men of the profession, the earnest and honest of whom will soon be called to take up the work which we must lay down.

An old writer has said, "Man's gift maketh room for him," so that the greater gift a man hath the more room is given him. To have room in the hearts of our fellows is a "consummation devoutly to be wished." These that I have referred to had large room in the hearts of their fellows, and so may we have if we emulate their kindly, helpful spirit.

I have thus spoken personally of these men because they were so helpful to me, and in the hope that I might encourage a larger cultivation of that gift among our older men, so that they may have more and more room made for them.

In closing, I have to refer to one not yet spoken of as a helper,—our venerable friend and more than father to me in dentistry, Dr. Atkinson. Words are inadequate to express the feeling of gratitude that wells up in my heart when I think of the help that he has so freely and earnestly given me all along my professional life; but I rejoice that I can feel that he is universally recognized as overflowing with that spirit of helpfulness which I have dwelt upon in this brief address, and that his gift has been so large that it has made for him corresponding room in the hearts of his fellows.

SECTION IV.

HISTOLOGY AND MICROSCOPY.

Growth of Enamel.

PAPER BY FRANK ABBOTT, CHAIRMAN OF THE SECTION.

A GREAT many acute and conscientious observers have exhausted their talent in attempting to reveal the mysteries surrounding the development of the dental tissues. All these honest attempts we are most grateful for, as they serve as stepping-stones which enable us to reach a height that renders the history of the development of these organs fairly intelligible. Our modern researches have conclusively settled the fact that the laws governing the formation of dental tissues are the same as those governing all other tissues of the animal body. The stumbling-block has always been developing enamel. For many years histologists have agreed that enamel is originally an epithelial formation, and consequently to be considered as a dermal or tegumentary appendage, as Todd and Bowman, in their celebrated cyclopedia (1848–49), have termed it. Still, the result of metamorphosis of the epithelia was known to be the stellate reticulum, which closely resembles myxomatous connective tissue. All observers heretofore have shrunk from the idea that epithelium could ever give rise to connective tissue, on merely theoretical grounds. The idea that epithelium will, under all circumstances, produce epithelial derivations exclusively, has apparently served as an insurmountable hindrance to the full understanding of the development of enamel.

How is it, we would ask, that brilliant thinkers could be satisfied with a single row of cells, supposedly epithelial in nature, that would give rise to a heavy layer of enamel, such as exists on the crowns of temporary teeth at the time of eruption? What is the function of the stellate reticulum,—a rather heavy layer of tissue,

so notable for its beautiful structure? Is there any satisfaction in the idea that this enamel-organ should serve merely for the nutrition of the enamel, or, as others have it, for protection, in the shape of a soft gelatinous cushion, against injuries of the enamel from without? It sounded almost like a revelation when G. Hertz, in 1866, had the courage to assert and maintain that the stellate reticulum, contributes directly to the formation of the enamel through a new formation of cells. The mistaken conception that the sum total of what we term odontoblasts was to be considered as a membrane known as the "membrana eboris," and the sum total of what we call ameloblasts as a membrane termed "membrana adamantina," wrought havoc in the minds of many histologists.

The secretion theory was one of the outgrowths of this membrane theory. A few good men, I am sorry to say, still cling to it.

A. Kölliker, in his "Handbook of Histology of Man" (1852), speaks of development of enamel in the following terms: "The development of the dental substances has always been considered a very difficult topic. The relations are the simplest in the enamel, where not the slightest doubt prevails that the enamel cells, by a complete calcification, become transformed into enamel-fibers (enamel-rods). As soon as a small portion of the cells, without any preliminary deposition of lime particles, is being ossified, we recognize a small lamella of enamel over the somewhat larger dentine cap, which has also recently originated. The deposition of lime proceeds in the cells from within outward till they have at last been transformed into enamel-fibers and simultaneously transgress on new cells, by which means the layer of enamel is broadened. While this is going on the enamel-membrane has not disappeared at the place where the ossification has started. On the contrary, we find this membrane always of the same breadth so long as the deposition of the enamel lasts, which proves that the ossified portion of the membrane is continuously being replaced by an additional mass. Apparently this is done, not by the production of new cells, but by a continual outgrowth of the original ones. The enamel-organ (stellate reticulum) is certainly of great importance in the building up of enamel, and owing to its richness in albumen and a gelatinous mass in its meshes is, so to speak, a pantry from which the enamel-membrane derives the material for its growth, being at some distance from the blood-vessels. In fact, we see this spongy tissue losing in its bulk during the development of enamel, and finally disappearing when the formation of enamel is completed."

I will here add that to Kölliker the enamel membrane means a layer of epithelium. He describes the enamel-organ as being made up of anastomosing star-shaped cells, or a reticular connective tissue, which in its meshes contains a large amount of albumen and a liquid rich in mucus. The same author, in his work on the "History of Development of Man and Higher Animals," in 1879, claims that the stellate reticulum of the enamel-organ in appearance is identical with connective tissue, but is really nothing but a peculiarly transformed epithelium. Kölliker, therefore, in 1852, held an opinion that we consider to-day the correct one, which he very materially modified, almost to the point of abandonment altogether, years later. This author was the first to announce that the theory of exclusiveness is not tenable, in the process of development, from the three original embryonal layers, the "ectoderm," the "mesoderm," and the "entoderm," or, using Balfour's terminology, the "epiblast," the "mesoblast," and the "hypoblast;" and still he narrows his views to an almost incredible degree, in the chapter upon development of enamel.

John Tomes, in his "Dental Physiology and Surgery" (London, 1848; Philadelphia, 1853), gives wonderfully accurate drawings of what he calls enamel-pulp, or columnar tissue, now known as ameloblasts. On page 102 he explains the development of enamel-rods or fibers in the following words: "The cells being formed in lines, eventually become confluent; the points of union being sometimes transverse, and at other times oblique. At this stage the earthy elements are received, and the lines of union between the component cells of the fibers become less distinct, and are eventually lost, leaving a continuous fiber. The nuclei, from the first very small, are altogether lost in the formation of the fibers, or exist as very fine tubes passing through the length of each."

On page 104 we read: "To the best of my belief the transverse striæ are due to the alternate dilatation and contraction of the fibers,—each dilatation corresponding to the center of a formative cell, and each contraction to the junction of two cells."

From these quotations it becomes evident that John Tomes was a most careful observer. Even at that early date, with the limited powers of his microscope, he conceived the full truth when he stated "that each enamel-rod is the result of a juxtaposition of formative cells, between which are left the striæ." He considers the formative cells as the recipients of the calcareous matter in exactly the same way that we see it to-day.

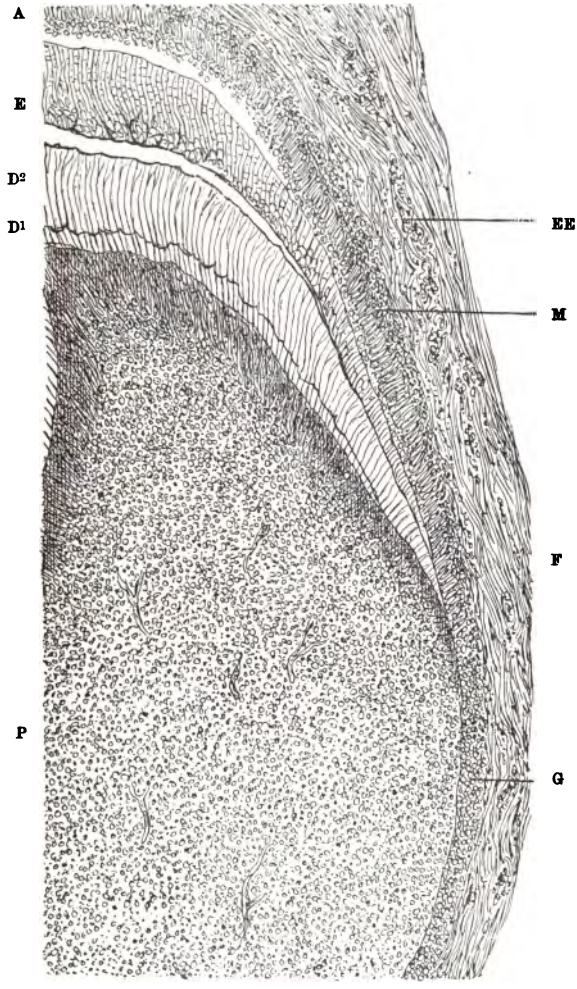
F. Waldeyer, in his "Handbook of Histology," edited by Stricker, in Leipzig, 1869, page 347, describes the formation of enamel in the following manner: "The formation of enamel is done exclusively by the enamel epithelium, since the enamel-prisms are the result of a direct calcification of its long cylindrical cells. The boundary of petrifaction on the cells is by no means linear, but extends downward to an irregular depth,—a fact which likewise is not in favor of the view that a secretion of the enamel-cells is being calcified. After treatment of young enamel with dilute acids, the enamel-prisms slightly swell and resume entirely the form of the previous cylindrical cells. The disappearance of the nuclei, in the process of the calcification of the cells, is of so common occurrence that their absence in the enamel cannot cause any wonder. Enamel, therefore, is to be considered as the petrified dental epithelium."

This author explains the formation of the stellate reticulum by a transformation of the epithelia, and considers its gelatin of a merely mechanical importance, since it keeps an open space for the growing tooth.

John and Charles S. Tomes, in their "System of Dental Surgery" (London, 1873, page 253) say, "The conclusions respecting the development of enamel which are most in accordance with appearances observed are these: The columns of the enamel-organ (enamel-cells, internal epithelium of the enamel-organ) are subservient to the development of the enamel-prisms into which they by calcification become actually converted. This conversion goes on in the following method: The proximal end of the cell undergoes some chemical change preparatory to calcification, and is subsequently calcified; but this calcification does not go on uniformly throughout its whole thickness, but proceeds from its periphery toward its interior, the central portion of the cell thus being calcified later than the external portion, which lies at the same level. At the same time that calcification is proceeding inward, in each individual cell, it has united the contiguous cells to each other. The calcification of the central portions of the enamel-fibers does not keep pace with that of their exteriors, nor even in fully completed enamel does it attain to precisely the same characters. In the progress of calcification the nuclei of the enamel-cells disappear, and it is probable, as is believed by Waldeyer, that the internal epithelium of the enamel is reunited by the cells of the stratum intermedium as it becomes itself used up by advancing calcification, converting it into enamel-fibers."

These authors give credit to Kölliker as the originator of the idea that the enamel-cells do not undergo direct conversion into enamel-

FIG. 1.



Tooth of human fœtus, six months.—P, papilla. D^1, non-calcified dentine. D^2, calcified dentine. E, enamel. A, row of ameloblasts. M, medullary corpuscles at the peripheral portion of ameloblasts. G, globular corpuscles from which ameloblasts develop. EE, buds of external epithelium. F, follicle, made up of fibrous connective tissue. × 100.

fibers, but that the enamel is, as it were, shot out from their ends; that is, it is a secretion from them, not a deposition of lime-salts into

their own substance. Our quotations from Kölliker's original German work, issued in Leipzig in 1852, plainly show that he at that time believed fully in the conversion theory. Since the Tomeses quote from the fifth German edition of Kölliker's histology, issued in 1867, it is obvious that he has changed his views, much, in my judgment, to his own disadvantage.

The latest publication upon the history of development of the enamel is that by C. Heitzmann and C. F. W. Bödecker,—"Contributions to the History of Development of the Teeth" (*Independent Practitioner*, vols. viii, ix, 1887–88).

This work is in harmony with my own observations, and furnishes the foundation of what I have to add, in the way of a more comprehensive idea, in the building process of enamel, than has heretofore been advanced. This I propose to give in as few words as I conveniently can and make myself clearly understood.

Fig. 1 gives an illustration of these views. The figure, it must be emphasized, is not diagrammatic, but copied with the utmost care from one of Bödecker's specimens of a human fœtus six months old, the period at which enamel begins to appear. The different layers, it will be observed, appear separated from one another. This is usually the case in even the most carefully prepared specimens, owing to slight mechanical injury in cutting, and shrinkage of the soft parts; the relations, however, are absolutely correct in this drawing.

After the epithelial peg has grown into the depth of connective tissue of the oral mucosa, in the twelfth week of embryonal development, the distal end of this peg becomes club-shaped, and then appears the first trace of medullary tissue, which two weeks later plainly shows the stellate reticulum. The club at this period assumes a cup shape, whose concave surface is lined by the internal epithelium, while the outer surface is made up of the so-called external epithelium, which is in uninterrupted continuity with the internal epithelium at the most prominent border of the cup. If we examine the lower edge of the cup of the enamel-organ at about the sixteenth week of embryonal life, we observe a peculiar change in the columnar bodies of the internal epithelium, which consists in the appearance of highly glistening globular bodies, in a more or less row-like arrangement, replacing the previous columnar epithelium. These bodies are either solid or slightly vacuoled, and are formations of living matter such as we are accustomed to look upon as medullary, embryonal, or indifferent corpuscles in their earliest

stage of appearance. Obviously these glistening globules have originated from the reticulum of living matter of the columnar epithelia themselves. We feel justified in this conclusion from the fact that we can trace, step by step, the growth of these glistening granules up to the formation of glistening lumps, such as we have termed medullary corpuscles. The more the cup of the enamel-organ is enlarged, the more conspicuous becomes the transmutation of the previous internal epithelium into glistening lumps; so much so that toward the end of the fifth month of fœtal life the original columnar epithelium at the concave portion of the cup has entirely disappeared. In its stead other bodies begin to show, first at the deeper portion of the cup, closely resembling columnar epithelia, now known as ameloblasts, or enamel-formers.

From this description it seems evident that all previous observers —with due respect to their judgment—have been in error in the assumption that the columnar epithelia of the internal wall of the cup were identical with the ameloblasts. All of them have overlooked the intermediate stage of the glistening medullary lumps. In Fig. 1 these lumps are marked G. They are traceable down to the neck of the papilla, therefore to the point of recurvation of the previous internal into the previous external epithelium. The lumps, I wish to repeat, are extremely glossy, with a high degree of refraction. They are arranged, at first irregularly, in a layer of considerable breadth, higher up in rows, and by their coalescence and prolongation give rise to small columns, the ameloblasts. These are seen up to the end of the fifth month of fœtal development at the deepest concavity of the cup and its lateral walls down to varying depths, and closely attached to the now forming dentinal cap. The odontoblasts grow smaller toward the thin extremity of the dentinal cap, and below its end they appear as blunt and short columns, while, close above, the ameloblasts make their appearance, being traceable all around the outer periphery of the dentinal cap.

In the sixth month of fœtal life, as is well known, the enamel-cap begins to show; first at the summit of the dentinal cap, where it gains its greatest breadth, gradually becoming thinner toward the sloping sides, and, as a whole, a trifle thinner and shorter than the dentinal cap.

If we now examine the ameloblasts close above the already-formed enamel, we will observe finely granular bodies, arranged in a row, between the enamel and ameloblasts. These are best seen in specimens where the hardening and cutting procedures have not

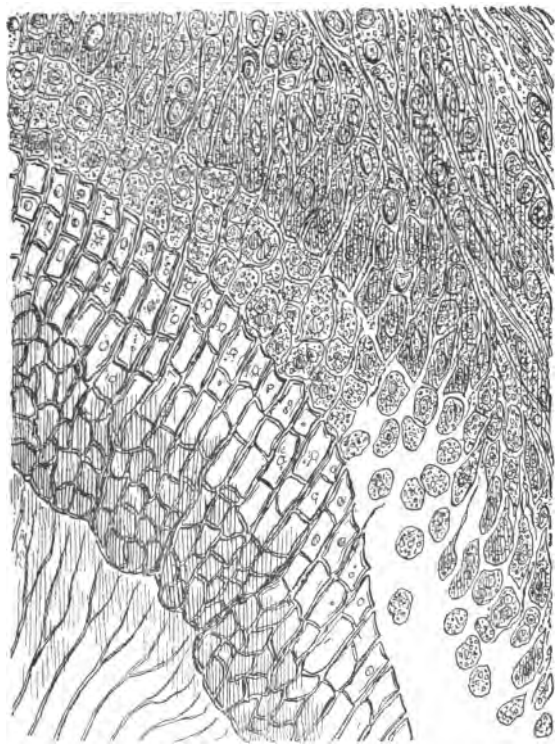
caused a detachment of the soft tissues from the hard,—*i.e.*, the enamel-organ from the calcified enamel. It is seldom that this is accomplished; but a few of such perfect specimens are in Bödecker's collection, which by his kind permission I have used for my studies and these drawings. Even though a slight detachment has occurred, the enamel-organ still remains intact, and the finely granular corpuscles at the proximal ends of the ameloblasts remain visible.

What are these finely granular bodies? The last-named authors claim that they are medullary corpuscles, holding small and indistinct or no nuclei, and only a very small amount of living matter, which accounts for their finely granular appearance with low powers of the microscope. They further claim that these corpuscles, or the liquids contained in their reticulum, become solidified into basis-substance, and immediately infiltrated with lime-salts. They claim also that the enamel-rods are built up by rows of such calcified or "petrified" medullary corpuscles, the successive arrangement of which into rows causes the more or less regular appearance of the transverse striæ of Retzius, whereas between the rows longitudinal interstices will remain, filled, perhaps, with a small amount of cement-substance, differing in its chemical constitution from the basis-substance of the rods proper, and in its interior holding extremely delicate fibrillæ (Bödecker's enamel-fibers) which branch into the transverse striæ. Being satisfied that the views of these gentlemen are correct, I will simply add a new feature, to make those views more symmetrical,—and, as it occurs to me, it is a feature of considerable importance: viz, the changes that take place in the ameloblasts during the process of the formation of enamel (Fig. 2).

The ameloblasts, as just stated, split up into rows of finely granular medullary corpuscles, and consequently are reduced considerably in their size. In fact, it is difficult to find full-sized ameloblasts at the summit of the enamel-cap, where the production of enamel is most active, the same as it is impossible to find full-sized odontoblasts at the summit of the papilla, where the formation of dentine is most active. The mutilated ameloblasts in this situation still exhibit nuclei, although their forms are odd,—mostly cut or broken, with offshoots running upward and laterally toward the stratum intermedium. At the same time peculiar glistening, homogeneous lumps and irregular wedge-shaped nucleated bodies appear between the offshoots of the ameloblasts; not so regular, however, as the original medullary corpuscles were, from which the ameloblasts originally developed. All these indifferent bodies must have arisen

from the living material stored up in the stratum intermedium, close above the row of ameloblasts. By their occasional row-like arrangement I am led to the conclusion that they serve for a *restitution* or *rebuilding* of the ameloblasts (which at their proximal ends have split up into *enamel-formers*), and thus serve to establish a con-

FIG. 2.



First-formed enamel of human fœtus, six months.—D, dentine. E, enamel, toward the dentine made up of irregular calcified fields, toward the periphery of prisms with transverse interruptions. M, medullary corpuscles finely granular, from which the enamel-prisms are formed. A, ameloblasts, toward the enamel breaking up into medullary corpuscles, toward the periphery rebuilt by such corpuscles. A^1, irregular ameloblasts torn from their connection with enamel. F, Fibrous connective tissue, changing to medullary tissue. × 800.

tinuity of the ameloblasts, and, in turn, of the enamel-rods, throughout the whole thickness of the enamel. In a previous article I have endeavored to show that odontoblasts, being split up at their distal ends into medullary corpuscles, enter directly into the formation of the basis-substance of dentine, at the same time being superadded

to at their proximal ends by medullary corpuscles derived from the living matter of the papilla. Thus the continuity of the odontoblasts and dentine is established, stratification of the dentine being the exception. I now assert a similar procedure for the ameloblasts, in a reverse direction, owing to the centrifugal direction of enamel growth. *The ameloblasts being broken up at their proximal ends into medullary corpuscles, which are directly transformed into blocks of enamel-rods, are superadded to at their distal or peripheral ends by medullary corpuscles derived from the stratum intermedium.* Normal enamel is non-stratified; its rods or prisms run a wavy course, as a rule uninterruptedly, from near the dentine to the cuticular (Nasmyth's) membrane.

Several years ago I described stratified enamel as rather an anomalous occurrence, it being as a rule connected with pigmentation of its rods. The study of this condition enabled me to show the manner in which enamel is formed,—first in crown layers around and upon the cusps, and much later in lateral or neck layers at the sides of the crowns. This fact again proves that the most active formation of enamel always takes place at the summit of the crowns or upon the cusps; while the lateral layers are formations of a much later date, and are much thinner.

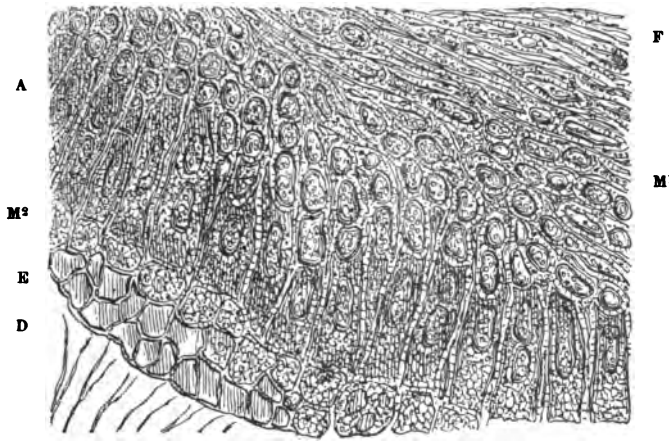
Neither the structure nor the development of this tissue is to me explicable on the ground of the cell theory, which suggests that each cell is an individual, and but exceptionally in connection with its neighbor. With us a cell is a lump of protoplasm, in which the living matter is stored up in different shapes. The glistening globules of small size, having arisen from the protoplasm of the original columnar epithelium of the enamel-organ, represent a juvenile condition of living matter in its most compact aggregation.

The medullary corpuscles, sprung from the ameloblasts, show only a delicate reticulum of living matter, being ready for immediate transformation into basis-substance and calcification. Between these extreme stages stand the ameloblasts, with their vesicular nuclei, and a markedly heavy reticulum of living matter in their interior. The indifferent corpuscles, serving to supply additions to the ameloblasts, exhibit all intermediate stages between small, globular, glossy and compact globules up to distinctly nucleated protoplasmic lumps. Whatever the size and shape of such lumps may be, they are invariably connected with one another by means of delicate offshoots, which vary greatly in thickness and in their course. Each ameloblast sends offshoots toward the dentine in

great numbers, known as Tomes's processes. They also run upward toward the intermediate layer, and laterally for the immediate union of neighboring ameloblasts. (See Fig. 3.)

Broad and clumsy offshoots, such as depicted by Tomes and Waldeyer, are visible only upon torn and teased ameloblasts. So long as these bodies are *in situ* the offshoots are always delicate, and visible with higher powers of the microscope only,—*i.e.*, from 800 to 1000 diameters. By the splitting up of the ameloblasts in a longitudinal direction, delicate wedge shaped pieces arise between funnel-shaped

FIG. 3.



Ameloblasts beginning the formation of enamel; from human fœtus, six months.—D, border of newly-formed dentine. E, first trace of forming enamel. A, row of ameloblasts. M^1, medullary corpuscles for restitution of ameloblasts. M^2, medullary corpuscles just previous to their infiltration with lime-salts. F, fibrous connective tissue, the so-called intermediate layer. × 1000.

or square bodies. By the coalescence of the lateral offshoots in a longitudinal direction, delicate fibrillæ originate between the ameloblasts, known as Bödecker's enamel-fibers.

When the formation of a tissue is going on, we conclude, from the great variety of forms of the protoplasmic bodies, that there is not for a moment rest either in the growth or in the new formation of living matter. Thus the proximal ends of the ameloblasts, through the intermediate stage of medullary corpuscles, are metamorphosed into the calcified basis-substance of the enamel-rods. The distal ends exhibit the stages through which the living matter passed before the original ameloblasts were formed. Still the question remains an open one, whether or not ameloblasts are an absolute

requirement for the production of enamel after the formation of the rods has once begun. The rows of globular bodies as seen in Fig. 3, M[1], strongly favor a negative answer to this query. Nothing but a transmutation of solid globular masses of living matter into delicately reticulate medullary corpuscles seems to be required for the building up of the minute blocks of enamel-rods without the intermediate stage of ameloblasts. We must admit, however, that, for symmetry of construction, the part played by these bodies seems essential. Although greatly varying in size, even in the same tooth, we consider ameloblasts as merely provisional formations, by

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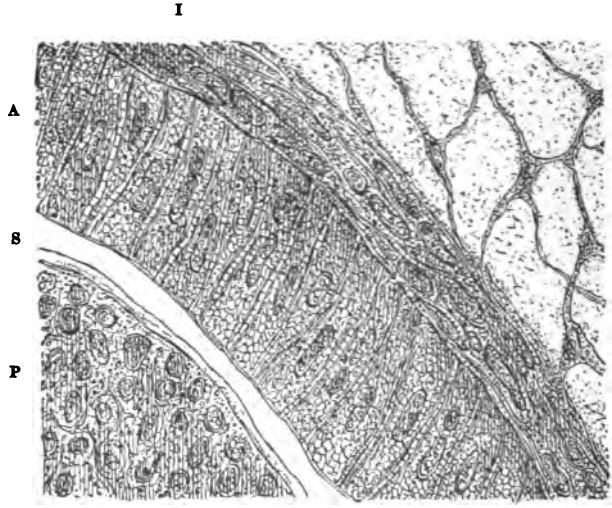
FIG. 4.



Ameloblasts at rest; from developing tooth of human fœtus, six months.—A, row of ameloblasts. I, I, intermediate layer. M, myxomatous reticulum. P, papilla. S, so-called structureless membrane. × 1000.

no means stable or unchangeable. This conclusion is the same as that we reached in regard to the significance of odontoblasts.

Full development of ameloblasts into oblong or conical bodies, each of which contains one or two nuclei, sharply bordered by a delicate cuticular formation toward the papilla, and distinctly marked by the intermediate layer toward the enamel-organ, is invariably seen only in the condition of temporary rest, where the formation of enamel has not as yet started. (See Fig. 4.) As soon as the first trace of enamel is seen the ameloblasts lose their regularity by being split up toward the dentine, and are superadded to from the intermediate layer.

The first-appearing enamel is made up of irregular angular and glistening lumps, greatly varying in size. (See Figs. 2 and 3.) The first blocks of enamel-rods show compact edges and comparatively thin and translucent centers, in which even traces of the nuclei of the medullary corpuscles are to be seen. This plainly shows the correctness of the assertion of Tomes, that "the enamel-rods are calcified from the periphery toward the center." The irregularity of the first-formed calcified blocks also accounts for the fact that fissures and breaks are of such common occurrence in specimens of enamel, either ground or cut, at the border toward the dentine, as I have previously demonstrated in an article on the anomalies of enamel, such anomalies being most common in this situation.

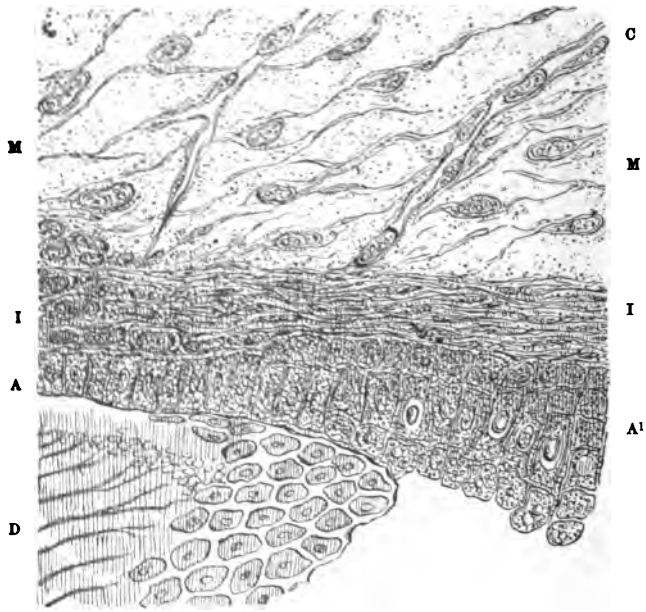
We now return to the enamel-organ, of which it is known that it begins to show at the end of the third month of intra-uterine life, by the appearance of medullary corpuscles between the internal and external epithelium. From the fourth month to the seventh or eighth, the beautiful stellate reticulum known as the enamel-organ comes to view. Although Huxley and Kölliker have stated (in 1850–52) that this is connective tissue, all modern writers, including Kölliker himself, insist that it is a peculiarly modified epithelium. I contend that this reticulum is true myxomatous, and the stratum intermedium true fibrous connective tissue. The first microscopist to describe and illustrate the intermediate layer was John Tomes, in 1848, in his work above quoted. This credit is usually given to Hannover, whose work appeared in 1856.

As to the significance of the enamel-organ, I must take decided exception to the views of most modern writers, viz, that it serves as a kind of protecting cushion, or to preserve an open space for the tooth to grow into. In my opinion the view first announced by Hertz in 1866, that "the enamel-organ is stored-up material for the benefit of the growing enamel itself," is the correct one, the same as is the intermediate layer. The reasons for this are given by Heitzmann and Bödecker in their above-quoted article.

One fact will strike every observer, viz, that the enamel is seldom, if ever, perfectly symmetrical in the growing tooth, one side being broader, to the extent of five or six times, than the other; sometimes it is found only on one side of the developing tooth, while on the other nothing but delicate fibrous connective tissue is seen. From these facts we must conclude that the myxomatous form of this organ is by no means a characteristic or an absolute requirement.

How can we explain the scantiness of this organ at the summit of the crown, where in full development the enamel has the greatest diameter? Can the original enamel-organ, even ever so broad, suffice for the production of the whole enamel? Is not the enamel coat of a temporary tooth five, nay, ten times as broad, as the original enamel-organ? All this strongly points toward the fact that the budding external epithelium, and even the primary epithelial peg,

FIG. 5.



Developing tooth of sheep's fœtus, 10 centimeters long—D, dentine in longitudinal and transverse sections. A, row of ameloblasts at rest. A1, ameloblasts broken up into medullary tissue, preceding the formation of enamel. I, I, intermediate layer. M, M, myxomatous enamel-organ. C, capillary blood-vessels. × 1000.

must furnish material for the building of enamel, no matter what the intermediate or subsequent changes of this tissue may be.

In conclusion, I wish to say that I have studied the development of enamel in pigs and sheep, and have found the relations similar to those in human beings. (See Fig. 5.) In the sheep's fœtus, ten centimeters long, the form-changes of the ameloblasts are especially pronounced, since shortly before the appearance of the enamel a splitting into medullary corpuscles takes place, for the production of enamel-rods; at the same time new medullary corpuscles show them.

selves at their distal ends, evidently produced at the expense of the intermediate layer. Both the last-named layer and the blood-vessels in the myxomatous enamel-organ have been observed and depicted by John Tomes as early as 1848,—an admirable instance of acute observation of lasting value.

DISCUSSION.

Dr. Sudduth, being called upon, said: As the exhibit we propose to give to-morrow evening will be upon the same subject, I think it will be wise for me to keep what remarks I have to make until I can talk to photographs of these tissues.

Dr. Atkinson: I have to express my general satisfaction with the subject to-night. I wish to take occasion, however, to call attention to an infection of doctrine that is couched in the request for a reservation of remarks until such times as these remarks should be addressed to us in the presence of photographs. What I want to emphasize is this, that these gentlemen who think they can see it all in a photograph have inferred that a photograph is more truthful than a drawing. Every man who knows anything of drawing at all knows that he has a great deal in the field that he does not care to keep before his vision if he wishes to trace the minute structure of any tissue that he is investigating. So that I most decidedly take exception to the fad of saying that photo-micrographs are *par excellence* the best means of promulgating the truth. There is no case in which we make an examination of tissue with the expectation of delineating all that is in that special specimen, but we take it up for the purpose of emphasizing and bringing to light certain aspects of the structure that may help us to go further, as all histologists have been doing up to the present time, which has been so clearly displayed in the paper we have just listened to. That it is advantageous for us to have a micro-photograph so enlarged as to let all the audience see it there is no question, but it is a valuable method that rather belongs to experts than to novices, and that is the very thing I wish to emphasize particularly,—my dissent from those men who claim that the light-painting of the camera is the only painting. All the painting that we have in our visual apparatus is light-painting; and all the modifications that we make in our drawing, in endeavoring to eliminate the dirt and irrelevant matter in the specimens, is a matter of choice, and its value depends entirely upon the culture of the individual who is engaged in making the drawing.

Had we more men who were willing to spend their time in the laboratory of Heitzmann, by quizzing each other and examining to their hearts' content, or discontent, as it sometimes is, we should be able to estimate each other's assumptions and assertions and objections at more nearly their true value. Each year as we go on I am rejoiced and strengthened to see the progress that is made. What has been considered political, or taking issue with individual views in regard to certain things, is dying out more and more, and we are desirous of getting at exactly what the truth is and to get such terminology as will enable us to express what our mental vision is when we see an object. I could run along in this investigation and show how I have had, myself, to cancel many things that I formerly thought were valuable. Paul said he believed he ought to do many things that were contrary to Jesus of Nazareth. I have thought just the same, that I should do many things that were contrary to the men who were teaching; but let us bring our contributions together, and in the spirit of true fraternity and desire for truth, pure and simple, pursue our investigations, and we shall have reason to rejoice from year to year at our onward progress.

Dr. Sudduth: In regard to the comparative value of photo-micrographs and drawings, I will say that I shall have the pleasure of showing to-morrow evening photographs of unicellular organisms —micro-organisms composed of single cells—in which the magnification is twelve hundred and fifty diameters, where the lines are as sharply outlined as they can possibly be drawn from microscopic objects. You can photograph anything that can possibly be seen, no matter how fine, in the microscope, and you can get just as sharp outlines if your preparations are well made. That much for comparison between drawings and photographs.

DENTISTRY IN CHINA AND THE EAST.

REMARKS BY J. WARD HALL, OF SHANGHAI.

DR. HALL, having been granted the privileges of the floor, was called upon to relate his experience as to dentistry in China and Japan, and spoke as follows:

Ten years have passed since I was known as a member of this body. It is useless to say that a change of residence to a part of the world little known to most of you, and ten thousand miles away, terminated a relationship with you that was to me, as a young man, very instructive and always pleasant. Had I remained at home, I had certain ambitions to be one of you, known to all of you, and thought enough of to be listened to at times.

There are a great many things about China and the practice of our profession in the East that I would like very much to talk to you about. I came here, however, to acquire information, not to impart it. Not being a member, I did not expect to be called upon to occupy your time; but I am ready to say what I can of dentistry and life in the East, and something of the status of our profession, which I learned on my journey home through India and Egypt and the Continent.

In the first place, I will disabuse your minds of the idea that in China or Japan the practice of dentistry, in any great degree, concerns the treatment of the native teeth. The foreigner practices among his own class of people, the English, Americans, and Continentals being the chief source of his practice and employment, so that the four hundred millions of Chinamen do not figure in the matter at all.

In respect to the practice of dentistry among the natives themselves, I will say that I do not think the time has arrived, even in Japan (which is far in advance of all other Eastern countries in the adoption of Western methods and ideas), when we may expect the intelligent and proper practice of dentistry as it is known to us. The Jap has carried the mechanical manipulation of metals in many respects to a point that we have not yet attained. The mere mechanical application of a metal to a tooth, and retaining it there, is as simple to him as the art he produces, and he can do it as well

and make the outside look as well as any other man; but he knows little of what he works upon or deals with.

He does not mind if the drill goes into the pulp; that is a minor consideration. He knows no chemistry, no anatomy. Our terms and instruments and much of our treatment he tries to apply; but in his tasks he has a very indistinct idea of what he is trying to do, or what our terms mean, or why our appliances were created.

The Chinaman, you may say, has no dentistry at all. He carves rude blocks of teeth in bone or ivory and ties them in with a string, or an old woman may set up shop outside of what we call a reputable practitioner's office, and with a stick extract worms from her subjects' teeth, showing them, to the wonder of a gaping crowd. The fixed points of dentistry among foreigners in China are well known. There are men out there well trained and skilled in the profession, and who practice it as skillfully as it is done elsewhere; and I believe the character of the work given to the residents in the far East is as good as the average of the work at home. There are nine Americans practicing dentistry on the coast of China. I do not believe there is a permanent American dentist in Japan. I am not certain that there is a sufficient field there for one. In all India there is not a truly American dentist. Not that the field is wanting, but the American is not yet forthcoming who can endure the climate and face the adverse circumstances that he must accept to build up a practice in such a country as India. Egypt, which is the winter residence of many Englishmen and their families, and many people from the Continent, on account of its dry and uniform climate, has its well-known American dentists, and the profession needs no criticism there. The distances in China, as in our own country, are great; and if most of you have as imperfect an idea of the geography and relative positions of the well-known points of the far East as I had when I went out, you will be glad to know that from Yokohama to Shanghai is about thirteen hundred miles, and that Japan is separated from China by the Yellow Sea, which is about five hundred or six hundred miles across, and divides us from the first Japanese port by about two days' journey by steamer. From Shanghai to Pekin is about one thousand miles. Pekin lies inland about one hundred and fifty miles from the sea, and the journey south is close upon one thousand miles to Hong Kong. In addition to that the treaty ports of China are found on the great Yang-Tse-Kiang, the greatest river in the East, navigable for about six hundred miles by the largest steamers. Most of your

tea comes from the uppermost port of the Yang-Tse-Kiang. The country that is now attracting the most attention in China, and which it is hoped will open up a very rich province for the commerce of foreigners, and so open eventually a field for us, is the great province of Szé-chuen, which lies farther up this great river and has never been opened up to the residence and the trade of foreigners.

To the young men who are entering upon the profession of dentistry, and looking, as I did, many years ago, to an enticing field abroad, I feel inclined to say a word to this effect, that a man who, with industry, talent, and ambition, cannot succeed in a country like this, will find poor market for his ability abroad. And be he never so able or industrious or successful abroad, he cannot suppress the feeling that he is an exile, and that the exchange of his country and his home and his friends for success abroad, which only means a monetary success, and that a very inadequate consideration, has been dearly made. He cannot help regretting at least that he left his own country and went to seek his fortune and his fame abroad. Advice to the young is cheap and rarely taken, but that is my experience.

Under the odontological law of Great Britain, which was passed, I think, twelve years ago, the diplomas of only two dental schools in the United States are accepted in England for registration without a question. The only other American dentists allowed to practice in England must practice behind the name of some other man or must have been in practice before the passage of the law. I was in America at the time this law was passed, and with a great many of you regarded it as a law for the advancement of the profession at large and the elevation of its standard of excellence.

There is a considerable row brewing in London on this subject at present. When that will bring about a final settlement of the questions arising I am not able to say. Although the present condition of affairs is not a satisfactory one, yet the difficulty of repealing a law such as the one that was passed and now rests upon the English statute-books is such that we cannot hope for a change very soon. There is now no odontological board of examiners, such as was first provided for, and no man can at present go over there and become a registered dentist under the English law without a diploma from Harvard or Ann Arbor.

I would like to speak to you in regard to the social status of the dentists in England and in India. The English people are essentially

a club-loving people, and especially in the colonies and in India. The membership of the club defines the character of the man. Not a dentist in all India is a member of the first-class clubs there, and they are all Englishmen with one or two exceptions. I do not think there is an American dentist in London who is a member of a really first-class club, or who occupies the position socially that many of them are entitled to, and it is largely due to the fact that in England and by English people the dentist is looked upon with disfavor on account of his profession. That is the feature which I object to. I do not ask that because a man is a dentist he shall be treated better than other men, but I do think that it is the right of every one who has the attributes and qualities of a gentleman, and the qualifications to make him agreeable in the society of gentlemen, to be admitted to such society; and the fact that he is a member of a profession that, barring the one of medicine, does as much practical good to the human family as any other, should not bar him out.

Dr. Morgan: I want to speak of the meeting of the American Medical Association in Nashville, next year; but first, a word with regard to dentistry in Japan. The Methodist Episcopal Church South has established a hospital in Tokio, in connection with their missionary work. Finding a need in the hospital for some one with a better knowledge of dental matters than is possessed by the average medical man, they wrote to the authorities of Vanderbilt University to know if they could not send over a young man with the necessary dental qualifications to take a position in the hospital, and with the opportunity afforded him of building up an outside practice. A young man has been selected and has accepted the proposition, and next spring he will proceed to his new duties.

The American Medical Association will meet in Nashville next May, the choicest month of the year to see that city. That Association, as is known perhaps to all of you, has a section of oral and dental surgery, and we invite you to come down and take a part in the deliberations, and enjoy our hospitality. Nashville is one of the handsomest cities in the country; and its population has doubled in eight years. Its many institutions of learning entitle it to be called the Athens of the South, if not of America. It has more schools than any other city of its size in the country. Then there are many points of interest in and about the city which visitors will be glad to have the opportunity of seeing. We wish to make this meeting one of more than usual interest, and we promise those who attend a most cordial welcome.

SECTION V.

MATERIA MEDICA AND THERAPEUTICS.

REPORT BY A. W. HARLAN, CHAIRMAN OF THE SECTION.

AS in former years, the greatest activity has prevailed in attempts to settle questions relating to the value of antiseptics and disinfectants in dental practice. The very elaborate report of Dr. G. V. Black read before the twenty-fifth anniversary meeting of the Chicago Dental Society most of the members present have read. This report dealt with the essential oils in particular, and their action in retarding or inhibiting the growth of microbes found in the human mouth. The above paper practically opened up the subject of the value in dental practice of the agents which, with a few minor exceptions, may be classed as non-coagulants.

Among the many cherished ideas of the practitioner of two or three decades ago was one that a therapeutic agent, used locally, should possess the property of destroying a portion, at least, of the tissue to which it was applied; or, if it did not do this absolutely, it should coagulate the surface, and produce that degree of irritation which was considered necessary to the early and quick healing of the diseased surface. This practice was conducted upon the theory that such agents were useful on soft tissues, and they were also recommended for obtunding sensitive dentine at the necks and in cavities in teeth. Such practices were even carried to the extent of trying to disinfect pulpless teeth where the pulps had long been dead and had decomposed in the teeth. The experiments above referred to, in fact, refute the idea that coagulants are necessary to accomplish the destruction of microbes. It is not denied here that coagulants are useful medicaments in dental practice, but we maintain that in the treatment of pulpless teeth for purposes of disinfection they are not only useless but detrimental; in fact, their use

defeats the object sought to be obtained. They coagulate the organic surface with which they come in contact, and prevent their own diffusion. A diffusible disinfectant is constant and ever-acting. One that coagulates, cooks, or destroys is not indicated in this line of practice.

As early as 1881 the chairman of this Section read before the Chicago Dental Society a paper on the value of essential oils, in which it was contended that many of them possessed potent antiseptic and disinfectant properties, as well as the property of producing a local anesthetic effect on living dentine. From that date to the present time thousands of experiments have been made by him to substantiate the claim that they were among the best, if not the best, class of agents for disinfecting pulpless teeth and the diseased tracts leading from the apices of roots from blind abscesses and abscesses with open fistulæ. The essential oils, cassia, cinnamon, peppermint, cajuput, thyme, tereben, eucalyptus, cloves, and some of their derivatives, are among the best and most pleasant to use in the mouth. They may be combined in varying proportions to insure efficacy, and possess no disagreeable odors. The oils also deprive many nauseous and irritating drugs of their disagreeable properties, forming new compounds in some instances.

The most remarkable property possessed by the essential oils is one that has heretofore escaped general attention. The writer first pointed this out in a paper read before the Odontological Society of Great Britain in 1887. Essential oils, of the varieties mentioned above and a few others not necessary here to particularize, when introduced into a cavity of a living tooth and sealed therein, slowly deposit vaporizable camphors, which are potent antiseptics. These camphors are very sparingly soluble in water, and in consequence of this are not easily dissipated by moisture should the cavity be not hermetically sealed. The same vaporizable camphors are likewise deposited when the oils are sealed within the roots of a tooth. It is on this account that they so readily and certainly disinfect polluted dentine.

The writer wishes it distinctly understood that he believes that the dentine of a pulpless tooth—long dead, and in which the pulp or other vegetable or animal matter has decomposed—must be disinfected in order to prevent a gradual deterioration of the cementum and pericementum. This is a necessity to insure a feeling of comfort in a pulpless tooth after the root and crown have been filled. Many pulpless teeth filled and treated by purely mechanical methods,

without respect to the complete disinfection of the dentine, are a permanent source of discomfort to their possessors.

Of the many agents and processes for disinfection of the dentine of a pulpless tooth, none possess so few disadvantages in the handling as the essential oils. They do not act with the instantaneous rapidity that some forms of mercury do, or even with the rapidity of hydrogen peroxide, but their action, if slower, is more perfect and continuous. The oils do not lose their property by exposure, they do not deteriorate, and their efficacy has been established clinically as well as in laboratory experiment. To sum up their advantages in dental practice I would say—

1. They possess local anesthetic properties.
2. They are stimulants.
3. They are non-coagulants.
4. They are sparingly soluble in water, and on this account are not contaminated by saliva, food, or other foreign substances.
5. They are diffusible.
6. The camphors which are deposited when brought in contact with the slightest quantity of water, saliva, or blood-serum are vaporizable as soon as formed, at a temperature of about 94° F. Their extreme volatility permits them to thoroughly impregnate the dentine. These camphors are disinfectants in full strength, as was shown by their deposition on the sides of tubes coated with broth in which various forms of bacteria were planted. In the ends of the tubes, where the camphors were not deposited, a vigorous growth was invariably observed.
7. The vaporizable camphors are the agents which disinfect the so-called blind abscesses, even when the oil is not introduced into the root of a tooth farther than the pulp-chamber, where it is sealed only moderately tight.
8. The foul contents of a root-canal, after being in contact with the oil of cinnamon (Ceylon), oil of cassia, and eugenol for two days, when planted in sterilized beef-broth failed to show any sign of life or development at the end of fourteen days. Repetition of this experiment by planting a fresh tube daily for fourteen days failed to show any sign of bacterial life.

DISCUSSION.

DR. BARRETT: The essayist names the oil of cassia and the oil of cinnamon. I shall be glad if he will state the distinction in the medicinal properties of the two.

DR. HORTON: I would also like to inquire of the gentleman if he uses them in combination or separately?

DR. HARLAN: If it is desired to know from whence the oils are obtained I will state that first. The oil of cassia is obtained from the bud and the oil of cinnamon from the bark of the same order of tree. The oil of cassia is a much cheaper and more abundant oil, and according to the experiments that Dr. Black reported it was the most potent oil in restraining the growth of microbes of all that he experimented upon. In the paper I mentioned only three oils that I had experimented with, and they were used singly, not in combination. The oil of cassia was introduced into the root-canals of a tooth the contents of which had not been removed, but which were foul-smelling and disgusting to look upon; the cavity was moderately sealed, and the oil was allowed to remain for two days, and from the contents of that tooth the germs were planted; and the experiment was repeated. The same line of experiments was followed with the oil of cinnamon,—Ceylon,—and another line of experiments of the same duration and planting every day with eugenol, which is a derivative of the oil of cloves, and may be considered the essential principle of the oil of cloves. In my case the cinnamic acid was not extracted from the oil of cinnamon or the camphoric peroxide from the oil of cassia, so that the oils were used just as they came from the shops. With reference to the medicinal properties, that subject I did not deal with. Their medicinal properties in this respect are confined to their action in the destruction of the microbes found within the teeth, where the pulps are putresced by their action, and not of any other class unless they gained access from the fluids of the mouth when the cavity was open before it had been treated. So far as the taste and odor and other properties of the oil of cassia and oil of cinnamon are concerned, it appears to me there is very little difference. Their action with reference to preventing the growth of microbes appears to be the same, although Dr. Black's experiments showed that the oil of cassia was more potent than the oil of cinnamon. But you may remember he used the oils in very dilute solution,—that is, by adding water and agitating, and heating and reagitating the oil and water,

and then using that small quantity of dissolved oil in the water, to see if it would inhibit the growth of microbes within the human mouth. I have used the oils in full strength without contamination. These oils are so sparingly soluble in water that they will not take up more than one-half to one per cent., even after long exposure to water. Decomposing the oil renders it a new substance.

DR. BARRETT: We breed confusion at times by introducing remedies that are essentially the same under different names. I do not apprehend there is any material difference between the oils of cassia and cinnamon. I do not understand that the one is derived from the body and the other from the bark, but that they are both derived from the bark of essentially the same plant. The term oil of cassia is given to the product of that plant which grows in China and which is more plentiful, while from that which is raised in the island of Ceylon is obtained what is commonly called cinnamon. The sole difference between the two is in their habitat. The simplification of our therapeutics is a thing to be cultivated, as far as may be, and consequently I should class the oil of cassia and the oil of cinnamon as essentially the same thing, and their medicinal properties as identical. The oil of cassia is cheaper because the plant is more plentiful and grows over a larger extent of territory in China than in the limited territory of the islands of Ceylon and of Java.

The introduction to the profession of some new and useful drug is a creditable thing; but to involve our materia medica by adding different names for the same preparation, or to recommend drugs which are untried and unproved, or to multiply names which signify nothing, or to add preparations which possess no peculiar virtue of their own, shows more of misdirected and untaught zeal than it does of discretion.

DR. ATKINSON: I think it is well to emphasize somewhat the thought of the last speaker, to know what we are dealing with. To simplify is to get within the grasp of the mind so as to understand; and it is by reason of the complication of various substances being nominated as the same thing, or the same thing being variously denominated as different things, and because we do not know just exactly enough about molecular changes of food, poison, and remedy to enable us to say just when a substance shall be catalogued as a stimulant, a tonic, a coagulant, an escharotic, etc.,—the terms which have been so loosely bandied about in therapeutics for all time,—that we are at loose ends and are not, on the first statement, able

to make ourselves clearly understood. What is the combination that constitutes the healing property? It is said to disinfect by destroying deleterious gases, and by destroying the microbe that is now claimed to be the immediate antecedent of the retrogressive metamorphosis that we call disease. We must know more about that before we can complete this investigation.

As to the oils of cassia and cinnamon, the Ceylon and China products, the greatest difference that I know of is the price. For less than two dollars we can get a pound of the oil of cassia, and it costs from twelve to sixteen dollars to get the Ceylon. I have used them both in the crude manner that I have been able to do. How do we know how they act upon microbes? All the fine details of how observers arrive at the mental perception to enable them to see a bacterium, and whether alive or dead, are almost ignored in all our investigations, and we must go a little deeper and nominate the changes that occur between the food-product and the chemical product that is the result of the changes made by bringing the various substances together. There are affinities resident in the primal elements that have to be satisfied, to bring about the changes that we have recognized. We have not recognized the true theory, so as to get at the alphabet of the molecular changes when we are considering the results, as we deal with diseased tissue.

SECTION VI.

PHYSIOLOGY AND ETIOLOGY.

Dental Implantation.

REPORT BY H. A. SMITH, CHAIRMAN OF THE SECTION.

AT the last annual meeting of this body I presented a report upon implantation in which were given the views of a number of dentists who had implanted teeth, regarding the causes of failure, manner of attachment, etc.

Believing that the practical question now is, How long will these operations remain successful? I again addressed a series of questions to the profession with the object of obtaining statements regarding the present condition of their cases of implantation.

The oldest case of implantation reported to be in perfect condition is the one made by Dr. W. J. Younger, July 17, 1885,—more than four years ago. Between the date of this operation and November, 1885, Dr. Younger has a record of twenty-six cases.* Of these only three were absolute failures; two were lost by accidental means; two are doubtful, yet hopeful; while nineteen are perfect. All will doubtless agree with Dr. Younger when he says, "I regard this as an exceedingly satisfactory showing, and when the conditions for success in both patient and tooth are well understood, there can be no doubt that even a *better* result will be obtained."

* Dr. Younger in a note says, "I regret I cannot give a complete list of all the implantations I have performed, with the data you request, because, with three or four exceptions, I have only made record of those cases performed in my office, where a fee was charged. Those performed as practice to acquire skill in operating, those for patients of other dentists, or at clinics, I made no note of. These cases are very much in excess of those recorded in my case-book."

Dr. Younger, with his usual courtesy, has furnished quite a full report of these twenty-six cases, which is made a part of this paper.

Dr. A. C. Hugenschmidt, of Paris, furnishes a report of six cases of implantation. The first of these operations was made early in 1888. Three, or 50 per cent., are now in excellent condition. Two that were lost were comparatively fresh teeth when implanted, while the three successful ones were old and dried teeth, one having been out of the mouth twenty years and another twenty-five years. He thinks that the age of the tooth to be implanted has nothing to do with the success of the operation. The peridental membrane appears to be of no use, since its revivification is impossible, and if it is inserted with the implanted tooth it is sure to be absorbed and disappear, as witnessed in his second unsuccessful case.

The mode of attachment, he thinks, is a close adaptation by deposition of bone around the sterilized foreign body,—a kind of bony encystment. All of Dr. Hugenschmidt's operations were done under the influence of cocaine, introduced hypodermically, and he states with perfect success.

Of the twenty-six cases reported by Dr. Younger twelve were implanted on the day of extraction, producing nine successful cases, two doubtful, and one failure. Two implantations were made with teeth a few days old: one was successful, one failed. In the remaining twelve cases "old teeth" were used. Of these nine were successful, three failed.

The general opinion has been that fresh teeth should be used for implantation. In the report last year we quoted Dr. Geo. Cunningham, of London, as saying, "Thus far I have used only freshly extracted teeth, and believe that if a tooth is implanted before the death of the pericementum and cementum the prospect of union is increased and the loss by absorption decreased." Dr. Ottolengui also recommends that the teeth used should not be more than one week old. The data just given do not bear out the opinion of these gentlemen, since out of thirty-two cases the percentages of success with old and with fresh teeth are about equal.

Dr. Hugenschmidt states that he has abandoned the practice of implantation, at least for the present, because of the failures occurring in his practice, as well as those he has observed from the hands of some of our best operators. The immediate success of the operation depends, he thinks, upon a close adaptation of the tooth to the new socket and the observance of strict antiseptic precautions throughout. He attributes his failures to a lack of skill in forming

the socket, whereby space was permitted around the root of the tooth for the development of pathogenic micro-organisms.

Dr. A. McFadyn, of California, reports thirteen cases of implantation since October, 1887, "with the most gratifying results in each." He fills the roots with chlora-percha and finishes the apex with gold. Bichloride of mercury, 2 to 1000, is used to sterilize the tooth, the instruments, and hands; Walker instruments used to prepare the socket.

Dr. G. L. Curtis reports, "I have implanted fifty teeth since October 8, 1886. When last seen or heard from, all were in a healthy condition except eight. Two of these were lost from absorption; three from decay of crowns, leaving roots firmly attached in the jaw; two by accident, and one from overstrain due to supporting one end of a long bridge. With but few exceptions, bands or staples connected to the adjoining teeth have been used to retain the implanted teeth in position until they became attached to the jaw. The bands were usually removed in from four to eight weeks. Bichloride of mercury was used as an antiseptic, followed by phénol-sodique as a mouth-wash. Instruments known as the Younger set were used. The age of patients varied from fourteen to fifty-eight years.

Dr. W. N. Morrison reports (in a general way) twelve cases of implantation. Nine of these were dried teeth obtained from extracting houses, the others were freshly extracted teeth. The first implantation was made April 17, 1886, and all, with two exceptions, are doing well. These two, the upper right first and second bicuspids, placed in the same mouth September 28, 1887, when last heard from were still in place, but not firm. In one case the upper right cuspid stood very much inside the line of the other teeth. It was extracted and placed in a new socket in its proper position, and proved a success. The roots of all teeth implanted were filled with gold wire and chlora-percha. No trimming of the roots was done. Supporting plates of thin vulcanite were made for each case and worn continuously for thirty days, and at night and at meals for fourteen days longer.

Dr. Louis Ottofy furnishes a full report of thirty-eight cases of implantation. Of these three were repetitions, one with gold root, and two mere experiments, leaving of *bona fide* cases thirty-two. Of these, two failed through accident. Of the remaining thirty cases twenty-two are in good condition, four doubtful, and four have failed. The doubtful cases, as well also as the four failures, he states "were

good cases." Hence the ratio of successes to failure is as 22 : 8, or 73 per cent. successful.

Dr. R. Ottolengui recently contributed to the literature of this subject a valuable paper,—"Implantation Surgically Considered." First calling attention to the importance of a careful study of the anatomy of the maxilla by those who undertake implantation, he insists upon the adoption of the most thorough antiseptic precautions throughout the operation, and gives his methods of accomplishing this. He describes the anatomical relation of the several classes of teeth to the maxilla, and gives in detail the manner of making the operation with incisors, cuspids, bicuspids, and molars —upper and lower. To those who wish to implant teeth and who may not be able to observe the operation clinically, a study of these descriptions will prove valuable.

In this paper he relates a case of implantation of the first bicuspid, in which he accidentally penetrated the antrum while preparing the socket. The severe hemorrhage which followed evidently came from a wounded arteriole in the lining membrane of the cavity. While the tooth was in place the blood escaped through the natural opening of the antrum, dripping into the throat behind the soft palate. After a few days, serious complications arose endangering the life of the patient, and not till five weeks after the operation was restoration complete. This case is instructive, inasmuch as it teaches of the possible (and with some classes of teeth the probable) danger of penetrating the antral cavity in our implantation operations.

Our statistics show a greater number of bicuspids implanted than all other teeth combined (25 to 20). It is with these teeth that the greatest danger is attended,—with the upper bicuspids of penetrating the antrum, and with the lower bicuspids of penetrating the inferior dental canal.

This danger can in a measure be overcome if the tooth is inserted shortly after extraction,—as soon as granulation-tissue has filled the socket and before much absorption of the alveolar process has taken place. We then have all the conditions of success that could be present at a later period, while the danger of penetration of the antrum is lessened with a full and unabsorbed process.

Shortening the root of the cion tooth also lessens the danger of accident, and it therefore is not quite clear why most implanters oppose this practice. If we assume that there is no vital attachment, that the tooth remains a passive object, the removal of the cementum and exposure of the dentine should not endanger the

success of the operation, since a denser and more resistant tissue is exposed to the action of the absorbing agents.

As to the true mode of attachment to which my last report referred, I do not know that any investigations have been made since then that would throw additional light upon the subject.

It is to be regretted that so few reports were received in response to a request to furnish implantation data. It indicates either that the operation is falling into disrepute even in so short a time since the first operation was made by Dr. Younger, or that dentists are neglectful of making careful records of their cases and results. It is to be hoped, however, that enough of the older cases have been reported to assist us in forming a more intelligent opinion as to the permanency of implanted teeth.

REPORT ON IMPLANTATION, BY DR. A. C. HUGENSCHMIDT, PARIS, FRANCE.

Date of Implantation.	Sex.	Age.	Tooth.	Age of Tooth.	Condition of Peridental Membrane.	Health of Patient.	Present Condition.	Remarks.
Feb. 11, '88	F.	30	L. Bic...	Old.....	All removed	.....	Perfect.....	Tooth sterilized in bichloride solution 1-2000.
Apr. 22, '88	F.	30	U. Bic...	1 year....	Fairly covered	.....	Removed in six weeks.	Root very dark in appearance; no sign of erosion; in one month implanted tooth in same place; lost in 3 days.
May 5, '88	M	23	U. Cent.	20 years.	Very little	Excellent.	Perfect.....	
May 16, '88	F.	40	U. Bic...	1 year...	Very little	Excellent.	Loose	Will be lost ultimately. June 28, 1889, tooth now firm.
July 3, '88	M	27	U. Lat...	25 years	Very little	Excellent.	Perfect.....	
July 16, '88	F.	36	U Bic...	2 years...	Perfect.....	Anæmic...	.....	

In the above cases the teeth were sterilized with bichloride of mercury, 1-2000. Half-hour before using, teeth were placed in sterilized water, temperature 98° F. Sockets washed with peroxide hydrogen and sterilized water. Hands and instruments washed in bichloride solution 1-2000, instruments being first passed through alcohol flame. The sockets were prepared with large engine-drill and finished with burs; the root-canals filled with gold, and in some the ends of the roots trimmed. The implanted teeth were retained by ligatures, worn from seven to thirty days.

Résumé.—Six implantations: three perfect successes, three failures.

REPORT ON IMPLANTATION, BY DR. W. J. YOUNGER, SAN FRANCISCO, CAL.

DATE OF IMPLANTATION.	PATIENT'S NAME.	AGE (ABOUT)	HEALTH OF PATIENT.	TOOTH.	AGE OF TOOTH.	PERIOSTEUM OVERLYING.	PRESENT CONDITION.	LENGTH OF TIME IN MOUTH.	CAUSE OF LOSS.
July 17, 1885...	Miss W.....	24 yrs...	Scrofulous.....	Sup. Lateral...	Fresh	Very little.....	Removed Sept. 1886	1 yr. 4 mo.	Erosion and over-modelling by other dentists
Aug. 14, 1885...	Miss C.....	35 yrs...	Delicate.....	Sup. Bicuspid..	Fresh.....	Well covered ..	Perfect.	3 yrs. 11 mo.	
Sept. 5, 1885 ...	Miss C.....	35 yrs ...	Delicate.....	Sup. Bicuspid .	Fresh.....	Well covered..	Perfect	3 yrs. 10 mo.	
Sept. 5, 1885....	Miss C.....	35 yrs ...	Delicate.....	Sup. Bicuspid..	Fresh.....	Well covered ..	A little loose, alveolus diseased by adjoining molar. Doubtful in consequence	1 yrs. 10 mo.	
Dec. 15, 1885...	Miss C.....	35 yrs....	Delicate.....	.....	Fresh	Well covered ..	Perfect....	1 yrs. 7 mo.	
Aug. 17, 1886 ..	Miss C.....	35 yrs....	Delicate.....	Molar.....	Fresh.....	Well covered .	Perfect.....	1 yrs. 11 mo.	
Mar. 24, 1886...	Mdm. C——n	50 yrs ...	Go d.....	Sup. Central....	Fresh.....	Well covered..	.....	1 yrs. 4 mo.	
June 2, 1886....	Mrs. C——n....	4 yrs ...	Good.....	Sup Bicuspid..	Old..	Well covered..	Perfect.....	1 yrs. 1 mo.	
June 10, 1886 ..	Mrs. K——g ...	45 yrs....	G ood.....	Sup Central ...	Old.....	Fairly covered	Perfect.	1 yrs. 1 mo.	
May 31, 1886 ..	Mrs C——r....	40 yrs....	Good.....	Sup Lateral....	Old..	Fairly covered	Perfect	1 yrs. 3 mo.	
May 6, 1886.....	Mrs. McK (C)..	27 yrs....	Good.....	Sup. Bicuspid..	Old..	Fairly covered	Perfect	1 yrs. 9 mo.	
Feb 24, 1886...	Mrs McK.....	32 yrs....	Good	Sup. Bicuspid..	Fresh.....	Fairly covered	Perfect	1 yrs. 5 mo.	
April 1, 1886...	Mrs. McK	32 yrs ...	Good.....	Sup. Cuspid....	Fresh.....	Well covered ..	Perfect.	1 yrs. 3 mo.	
April 2, 1886...	Capt de M	42 yrs....	Good	Inf. Bicuspid...	4 days old..	Well covered...	Perfect	1 yrs. 3 mo.	
April 7, 1886....	Capt. de M.....	42 yrs....	Good.	Inf Bicuspid ..	9 days old .	Well covered ..	Failed in 3 months		Non attachment. Injured by too long soaking in bichloride of mercury
June 18, 1886...	Mrs S.....	35 yrs ...	Anæmic; an invalid always.	Sup. Lateral....	Old..	Fairly covered	Out..	1 yrs. 1 mo.	Removed in consequence of accident. Re-implanted by eroded. Inserted another tooth
June 18, 1886..	Mrs. S.....	45 yrs ...	Anæmic; an invalid always.	Sup. Lateral. ..	Old.....	Fairly covered	Out	1 yrs. 1 mo.	Removed in consequence of accident. Inserted another tooth
Feb. 25, 1886...	Miss T.....	26 yrs....	Delicate.....	Sup. Bicuspid..	Fresh.....	Fairly covered	Perfect.	1 yrs. 5 mo.	
Nov. 25, 1885...	Capt. D.....	34 yrs ...	Good.	Sup. Bicuspid .	Fresh.....	Fairly covered	Perfect.....	4 yrs. 8 mo.	
Nov. 25, 1885...	Capt. D.....	34 yrs ...	Good.	Sup. Bicuspid..	Fresh	Fairly covered.	Perfect.....	4 yrs. 8 mo.	Have been notified fall are had occurred.
Sept. 6, 1886....	Mr. L.....	50 yrs....	Go d.....	Sup. Central....	Old.....	Very little.....	Perfect.	4 yrs. 10 mo.	
Sept. 6, 1886. ..	Mr. L.....	50 yrs ...	Good.....	Sup. Lateral....	Old..	Very little.....	Perfect..	2 yrs. 10 mo.	
Mar. 11, 1886...	Mrs. B.....	40 yrs....	Go d.....	Sup. Bicuspid.	Old.....	Fairly covered	Out	4 yrs. 6 mo.	Erosion.
Nov. 18, 1886...	Miss C.....	40 yrs....	Good.....	Sup. Cuspid....	Old.....	Fairly covered	Perfect.....	2 yrs. 8 mo.	
Nov. 18, 1886...	Miss C.....	40 yrs ...	Good.....	Sup. Cuspid....	Old.....	Fairly covered.	Perfect.....	2 yrs. 8 mo..	
Nov. 9, 1886.....	Miss C.....	30 yrs ...	Good.....	Sup. Bicuspid.	Old.....	Fairly covered	Perfect.....	2 yrs. 8 mo.....	

All of these teeth were filled from root with Hill's Stopping, and finished at the apex with gold or tin. My practice now is to fill from the crown and thus avoid, if possible, injury to the apex. Teeth were sterilized with one mill. solution of bichloride of mercury in water; the wound, hands, and instruments with a 2-1000 solution.

Résumé.—Total number of implantations accounted for, 26. Lost by erosion, 2; lost by accident, 2; lost by non-attachment, 1; doubtful, 2; perfect, 19.

Number of teeth implanted same day of extraction, 12. Of these, 9 were successful, 1 failed, and 2 are doubtful.

Number of teeth implanted comparatively fresh (few days old), 2. Of these 1 was successful and 1 failed.

Number of teeth implanted, time of extraction remote (old teeth), 12. Of these, 9 were successful and 3 failed.

REPORT ON IMPLANTATION, BY DR. LOUIS OTTOFY, CHICAGO, ILL.

No.	Date.	Sex.	Temperament.	Physical condition.	Date of extraction of Implanted Teeth.	Condition of Peridental Membrane.	Root-Canal Filling.	Preparation of Root.	Antiseptic used during Operation.	Mouth-Wash recommended.	Instruments used.	Sterilized by.	Retaining Appliance used.	Failed.	Not under Observat'n	Under Observation at date mentioned.	Condition.	Cause of Failure.	How Lost.	Condition after Removal.	REMARKS.
1	1887, Jan. 15...	F	P	G	U	PP	GP	NT	B	CH	RYW	C	D	×	×	.....	Failed...	Accident.....	Dropped out	Absorption.....	Tooth broke; capping led to irritation.
2	" Feb. 11...	M	N	G	U	PP	GP	NT	B	H	RYW	C	Bd	×	×	.....	Failed...	Experiment	Dropped out.	Absorption.....	Unwisely implanted.
3	" Feb. 15...	F	P	G	U	PP	GP	NT	B	H	RYW	C	Bd	...	...	July, 1889.	Poor.....	Accident.....	.....	.....	Inflam. from adj. tooth. Perf. antrum.
4	" Feb. 23...	M	S	G	U	PP	GP	NT	B	H	YW	C	D	...	...	May, 1889.	Good.....	.....	.....	.....	
5	" Mar. 7....	F	N	G	U	PP	GP	NT	B	H	YW	C	Cap	...	...	May, 1889.	Good	.....	.....	.....	
6	" April 6...	F	S	G	U	PP	GP	NT	B	H	YW	C	RBd	...	...	May, 1889.	Good.....	.....	.....	.....	
7	" April 7...	M	S	G	U	PP	GP	NT	B	H	YW	C	D	...	...	May, 1889.	Good	.....	.....	.....	
8	" April 13..	M	N	G	U	PP	GP	NT	B	H	YW	C	RBd	×	×	.....	Failed...	Experiment	Took it out..	Unchanged.....	Unwisely implanted.
9	" May 5....	M	S	G	U	PP	GP	NT	B	H	YW	C	Cap	...	...	June, 1889.	Poor.....	Bad case	.....	.....	
10	" May 5	M	S	G	U	PP	GP	NT	B	H	YW	C	D	×	×	.....	Failed...	Unknown.....	Unknown....	Unknown.....	Cannot get report.
11	" May 6....	M	S	G	U	PP	GP	NT	B	H	YW	C	D	...	...	May, 1889.	Good.....	.....	.....	.....	
12	" May 12...	M	S	G	U	PP	GP	NT	B	H	YW	C	Cap	...	...	May, 1889.	Poor.....	Abs. of adj. tooth	.....	.....	
13	" May 12...	M	S	G	U	PP	GP	NT	B	H	YW	C	D	...	...	May, 1889.	Good.....	.....	.....	.....	
14	" June 9....	F	P	G	U	PP	GP	NT	B	H	YW	C	D	...	...	July, 1889.	Good.....	.....	.....	.....	
15	" June 30..	M	S	G	U	PP	GP	NT	B	H	YW	C	Cap	×	×	.....	Failed...	Unknown.....	Dropped out	Absorption....	Perforated the antrum.
16	" Sept. 6....	M	N	G	U	PP	GP	NT	B	H	OYW	C	Cap	×	×	.....	Failed...	Accident.....	Knocked out	.....	
17	" Nov. 15...	M	S	G	U	PP	GP	NT	B	H	Y	C	Cap	...	...	May, 1889	Good.....	.....	.....	.....	
18	1888, March 5..	F	N	G	U	PP	GP	NT	B	H	Y	C	Cap	...	...	July 1889.	Good.....	.....	.....	.....	
19	" May 16...	M	S	G	U	PP	GP	NT	B	H	OYW	C	D	...	...	June, 1889.	Good.....	.....	.....	.....	
20	" May 17...	M	S	G	U	PP	GP	NT	B	H	OYW	C	Cap	...	...	June, 1889.	Poor.....	Unknown.	.....	.....	
21	" June 4....	F	N	G	U	PP	GP	T	B	L	OYW	C	D	×	...	See No 37.	Failed...	Absorption.....	Extracted....	Absorption.....	Repeated with success.
22	" June 8....	F	N	G	U	PP	GP	T	B	L	OYW	C	D	...	...	July, 1889.	Good.....	.....	.....	.....	
23	" Aug. 13 .	F	P	G	U	PP	GP	NT	B	L	Y	C	Cap	...	...	July, 1889.	Good.....	.....	.....	.....	
24	" Sept. 14 ..	M	N	G	U	PP	GP	NT	B	L	OYW	C	Cap	×	...	See No. 28.	Failed..	Absorption.....	Extracted....	Absorption.....	Repeated with success.
25	" Oct 10. ..	M	S	G	U	PP	GP	NT	B	H	OYW	C	Cap	...	...	May, 1889.	Good. ...	.....	.....	.....	
26	" Oct. 10....	M	S	G	U	PP	GP	NT	B	H	OYW	C	Cap	×	×	.....	Failed...	Unknown.....	Unknown....	Unknown.....	
27	" Oct. 10....	M	S	G	U	PP	GP	T	B	H	OYW	C	Cap	...	...	May, 1889.	Good.....	.....	.....	.....	
28	" Nov. 5....	M	N	G	U	PP	GP	NT	B	L	Y	C	Cap	...	...	June, 1889	Good.....	.....	.....	.....	
29	" Dec. 4....	M	P	G	U	PP	GP	T	B	L	OYW	C	Cap	...	...	Aug., 1889.	Good.....	.....	.....	.....	
30	1889, Jan. 15...	M	S	G	U	PP	GP	T	B	L	OYW	C	Cap	×	×	.....	Failed...	Unknown.....	Unknown....	Unknown.....	
31	" Jan. 15...	M	S	G	U	PP	GP	T	B	L	OYW	C	Cap	...	...	May, 1889.	Good.....	.....	.....	.....	
32	" Jan. 31...	M	N	G	U	PP	GP	NT	B	L	Y	C	Cap	...	...	June 1889.	Good.....	.....	.....	.....	
33	" Feb 6 ...	M	N	G	U	PP	GP	T	B	L	OO×	C	Cap	×	...	See No. 35.	Failed...	Unknown.....	Dropped out.	Unknown.....	Repeated with success.
34	" Mar. 12...	M	S	G		Gold	Root.		B	L	OO×	C	D	×	...	June, 1889.	Failed...	Experiment.....	Dropped out.	A gold root	This was a gold root.
35	" April 19 .	M	N	G	U	PP	GP	T	B	L	Y	C	Cap	...	...	Aug., 1889.	Good.....	.....	.....	.....	
36	" April 23..	F	S	G	U	PP	GP	NT	B	L	Y	C	Cap	...	...	Aug., 1889.	Good.....	.....	.....	.....	
37	" June 8 ...	F	N	G	U	PP	GP	T	B	L	Y	C	Cap	...	...	Aug., 1889.	Go d.....	.....	.....	.....	
38	" July 13...	M	S	G	U	PP	GP	NT	B	L	Y	C	Cap	...	...	Aug., 1889.	Good	.....	.....	.....	

Explanation.—F, female. M, male. P, phlegmatic. N, nervous. S, sanguine. G, good. U, unknown. PP, presumed perfect. GP, gutta-percha. NT, not trimmed. T, trimmed. B, bichloride of mercury, 1-500, 1-1000, or 1-2000. H, sat. solution of hydronaphthol. L, listerine. O×, Ottolengui's instruments. O, Ottofy's crib-knife. W, Walker's trephines. Y, Younger's instruments. R, Rollins's tubular knife. C, bichloride of mercury, 1-2000. Cap, gold or platinum cap. Bd, band of gold or platinum. RBd, rubber-dam band. D, nothing. ×, see head of column. In no case was an antiseptic used in preserving the tooth for implantation.

DISCUSSION.

DR. BARRETT: The essayist names the oil of cassia and the oil of cinnamon. I shall be glad if he will state the distinction in the medicinal properties of the two.

DR. HORTON: I would also like to inquire of the gentleman if he uses them in combination or separately?

DR. HARLAN: If it is desired to know from whence the oils are obtained I will state that first. The oil of cassia is obtained from the bud and the oil of cinnamon from the bark of the same order of tree. The oil of cassia is a much cheaper and more abundant oil, and according to the experiments that Dr. Black reported it was the most potent oil in restraining the growth of microbes of all that he experimented upon. In the paper I mentioned only three oils that I had experimented with, and they were used singly, not in combination. The oil of cassia was introduced into the root-canals of a tooth the contents of which had not been removed, but which were foul-smelling and disgusting to look upon; the cavity was moderately sealed, and the oil was allowed to remain for two days, and from the contents of that tooth the germs were planted; and the experiment was repeated. The same line of experiments was followed with the oil of cinnamon,—Ceylon,—and another line of experiments of the same duration and planting every day with eugenol, which is a derivative of the oil of cloves, and may be considered the essential principle of the oil of cloves. In my case the cinnamic acid was not extracted from the oil of cinnamon or the camphoric peroxide from the oil of cassia, so that the oils were used just as they came from the shops. With reference to the medicinal properties, that subject I did not deal with. Their medicinal properties in this respect are confined to their action in the destruction of the microbes found within the teeth, where the pulps are putresced by their action, and not of any other class unless they gained access from the fluids of the mouth when the cavity was open before it had been treated. So far as the taste and odor and other properties of the oil of cassia and oil of cinnamon are concerned, it appears to me there is very little difference. Their action with reference to preventing the growth of microbes appears to be the same, although Dr. Black's experiments showed that the oil of cassia was more potent than the oil of cinnamon. But you may remember he used the oils in very dilute solution,—that is, by adding water and agitating, and heating and reagitating the oil and water,

and then using that small quantity of dissolved oil in the water, to see if it would inhibit the growth of microbes within the human mouth. I have used the oils in full strength without contamination. These oils are so sparingly soluble in water that they will not take up more than one-half to one per cent., even after long exposure to water. Decomposing the oil renders it a new substance.

Dr. Barrett: We breed confusion at times by introducing remedies that are essentially the same under different names. I do not apprehend there is any material difference between the oils of cassia and cinnamon. I do not understand that the one is derived from the body and the other from the bark, but that they are both derived from the bark of essentially the same plant. The term oil of cassia is given to the product of that plant which grows in China and which is more plentiful, while from that which is raised in the island of Ceylon is obtained what is commonly called cinnamon. The sole difference between the two is in their habitat. The simplification of our therapeutics is a thing to be cultivated, as far as may be, and consequently I should class the oil of cassia and the oil of cinnamon as essentially the same thing, and their medicinal properties as identical. The oil of cassia is cheaper because the plant is more plentiful and grows over a larger extent of territory in China than in the limited territory of the islands of Ceylon and of Java.

The introduction to the profession of some new and useful drug is a creditable thing; but to involve our materia medica by adding different names for the same preparation, or to recommend drugs which are untried and unproved, or to multiply names which signify nothing, or to add preparations which possess no peculiar virtue of their own, shows more of misdirected and untaught zeal than it does of discretion.

Dr. Atkinson: I think it is well to emphasize somewhat the thought of the last speaker, to know what we are dealing with. To simplify is to get within the grasp of the mind so as to understand; and it is by reason of the complication of various substances being nominated as the same thing, or the same thing being variously denominated as different things, and because we do not know just exactly enough about molecular changes of food, poison, and remedy to enable us to say just when a substance shall be catalogued as a stimulant, a tonic, a coagulant, an escharotic, etc.,—the terms which have been so loosely bandied about in therapeutics for all time,—that we are at loose ends and are not, on the first statement, able

to make ourselves clearly understood. What is the combination that constitutes the healing property? It is said to disinfect by destroying deleterious gases, and by destroying the microbe that is now claimed to be the immediate antecedent of the retrogressive metamorphosis that we call disease. We must know more about that before we can complete this investigation.

As to the oils of cassia and cinnamon, the Ceylon and China products, the greatest difference that I know of is the price. For less than two dollars we can get a pound of the oil of cassia, and it costs from twelve to sixteen dollars to get the Ceylon. I have used them both in the crude manner that I have been able to do. How do we know how they act upon microbes? All the fine details of how observers arrive at the mental perception to enable them to see a bacterium, and whether alive or dead, are almost ignored in all our investigations, and we must go a little deeper and nominate the changes that occur between the food-product and the chemical product that is the result of the changes made by bringing the various substances together. There are affinities resident in the primal elements that have to be satisfied, to bring about the changes that we have recognized. We have not recognized the true theory, so as to get at the alphabet of the molecular changes when we are considering the results, as we deal with diseased tissue.

SECTION VI.

PHYSIOLOGY AND ETIOLOGY.

Dental Implantation.

REPORT BY H. A. SMITH, CHAIRMAN OF THE SECTION.

AT the last annual meeting of this body I presented a report upon implantation in which were given the views of a number of dentists who had implanted teeth, regarding the causes of failure, manner of attachment, etc.

Believing that the practical question now is, How long will these operations remain successful? I again addressed a series of questions to the profession with the object of obtaining statements regarding the present condition of their cases of implantation.

The oldest case of implantation reported to be in perfect condition is the one made by Dr. W. J. Younger, July 17, 1885,—more than four years ago. Between the date of this operation and November, 1885, Dr. Younger has a record of twenty-six cases.* Of these only three were absolute failures; two were lost by accidental means; two are doubtful, yet hopeful; while nineteen are perfect. All will doubtless agree with Dr. Younger when he says, "I regard this as an exceedingly satisfactory showing, and when the conditions for success in both patient and tooth are well understood, there can be no doubt that even a *better* result will be obtained."

* Dr. Younger in a note says, "I regret I cannot give a complete list of all the implantations I have performed, with the data you request, because, with three or four exceptions, I have only made record of those cases performed in my office, where a fee was charged. Those performed as practice to acquire skill in operating, those for patients of other dentists, or at clinics, I made no note of. These cases are very much in excess of those recorded in my case-book."

Dr. Younger, with his usual courtesy, has furnished quite a full report of these twenty-six cases, which is made a part of this paper.

Dr. A. C. Hugenschmidt, of Paris, furnishes a report of six cases of implantation. The first of these operations was made early in 1888. Three, or 50 per cent., are now in excellent condition. Two that were lost were comparatively fresh teeth when implanted, while the three successful ones were old and dried teeth, one having been out of the mouth twenty years and another twenty-five years. He thinks that the age of the tooth to be implanted has nothing to do with the success of the operation. The peridental membrane appears to be of no use, since its revivification is impossible, and if it is inserted with the implanted tooth it is sure to be absorbed and disappear, as witnessed in his second unsuccessful case.

The mode of attachment, he thinks, is a close adaptation by deposition of bone around the sterilized foreign body,—a kind of bony encystment. All of Dr. Hugenschmidt's operations were done under the influence of cocaine, introduced hypodermically, and he states with perfect success.

Of the twenty-six cases reported by Dr. Younger twelve were implanted on the day of extraction, producing nine successful cases, two doubtful, and one failure. Two implantations were made with teeth a few days old: one was successful, one failed. In the remaining twelve cases "old teeth" were used. Of these nine were successful, three failed.

The general opinion has been that fresh teeth should be used for implantation. In the report last year we quoted Dr. Geo. Cunningham, of London, as saying, "Thus far I have used only freshly extracted teeth, and believe that if a tooth is implanted before the death of the pericementum and cementum the prospect of union is increased and the loss by absorption decreased." Dr. Ottolengui also recommends that the teeth used should not be more than one week old. The data just given do not bear out the opinion of these gentlemen, since out of thirty-two cases the percentages of success with old and with fresh teeth are about equal.

Dr. Hugenschmidt states that he has abandoned the practice of implantation, at least for the present, because of the failures occurring in his practice, as well as those he has observed from the hands of some of our best operators. The immediate success of the operation depends, he thinks, upon a close adaptation of the tooth to the new socket and the observance of strict antiseptic precautions throughout. He attributes his failures to a lack of skill in forming

the socket, whereby space was permitted around the root of the tooth for the development of pathogenic micro-organisms.

Dr. A. McFadyn, of California, reports thirteen cases of implantation since October, 1887, "with the most gratifying results in each." He fills the roots with chlora-percha and finishes the apex with gold. Bichloride of mercury, 2 to 1000, is used to sterilize the tooth, the instruments, and hands; Walker instruments used to prepare the socket.

Dr. G. L. Curtis reports, "I have implanted fifty teeth since October 8, 1886. When last seen or heard from, all were in a healthy condition except eight. Two of these were lost from absorption; three from decay of crowns, leaving roots firmly attached in the jaw; two by accident, and one from overstrain due to supporting one end of a long bridge. With but few exceptions, bands or staples connected to the adjoining teeth have been used to retain the implanted teeth in position until they became attached to the jaw. The bands were usually removed in from four to eight weeks. Bichloride of mercury was used as an antiseptic, followed by phénol-sodique as a mouth-wash. Instruments known as the Younger set were used. The age of patients varied from fourteen to fifty-eight years.

Dr. W. N. Morrison reports (in a general way) twelve cases of implantation. Nine of these were dried teeth obtained from extracting houses, the others were freshly extracted teeth. The first implantation was made April 17, 1886, and all, with two exceptions, are doing well. These two, the upper right first and second bicuspids, placed in the same mouth September 28, 1887, when last heard from were still in place, but not firm. In one case the upper right cuspid stood very much inside the line of the other teeth. It was extracted and placed in a new socket in its proper position, and proved a success. The roots of all teeth implanted were filled with gold wire and chlora-percha. No trimming of the roots was done. Supporting plates of thin vulcanite were made for each case and worn continuously for thirty days, and at night and at meals for fourteen days longer.

Dr. Louis Ottofy furnishes a full report of thirty-eight cases of implantation. Of these three were repetitions, one with gold root, and two mere experiments, leaving of *bona fide* cases thirty-two. Of these, two failed through accident. Of the remaining thirty cases twenty-two are in good condition, four doubtful, and four have failed. The doubtful cases, as well also as the four failures, he states "were

from it. That has taught me that I must look for my failures elsewhere than from the denuded root, and if Dr. Curtis accredits me with the same honesty that I attribute to him, he must decide that the presence of the periosteum or pericementum cannot be as detrimental as he had supposed. This is valuable knowledge for me, and I think of importance to him. It is this exchange of views and experiences that makes our associations profitable. Regarding the color of the teeth, everyone knows that the hair, cuticle, eyes, and teeth are dependent upon the fluids of the body for their color. Place a tooth in a socket and retain it there by ligatures for a month or six weeks, it will assume the color of its neighbors, whether union takes place or not. The circulation of fluids through the teeth is not a vital force, but simply hydrostatic. The fluids that have established the color of the normal teeth have an equal influence on the implanted ones.

DR. PATTERSON: How did the fluids pass in?

DR. PEIRCE: By absorption or endosmose. The gentleman is certainly familiar with the difference in weight between a saturated and a dry tooth. Our inserted teeth are usually dry; the fluids from the vessels pass readily into them, giving them the natural color or the shade of the adjoining teeth. Such at least is the result with teeth inserted.

DR. MARSHALL: Simply drying a tooth changes its color.

DR. PEIRCE: I know it does.

DR. RHEIN: I object to the use of the term "success" in any of the reports that have been presented on this subject. I do not think that sufficient time has elapsed since the operations have been performed to justify the considering any one of the individual cases of implantation a success at the present time. I have never performed the operation of implantation, but having performed that of replantation in some fifteen or twenty cases a number of years ago, am led to think that the same retrograde metamorphosis of the tissues would be likely to ensue upon implantation as so generally follows replantation. The number of cases of implantation which have failed around New York City during the past year have been much more numerous than they have been in the past, as I learn from some who have had the operations performed for their patients by Dr. Younger, and from others who have performed the operations themselves; and it is for this reason that I wish to put in a protest against the use of the term success at the present time. One gentleman spoke about one of the operators not paying any attention to

what class of teeth he used in his operations, whether they came from a healthy or an unhealthy person. If implantation is to become a recognized operation, the greatest care must be taken in the selection of teeth. Some day some member of the profession may find himself in considerable trouble if he should happen to implant a tooth that has been taken from a syphilitic mouth. Just as soon as you get retrograde metamorphosis of the tooth that has been implanted, I can see no reason why you do not run the risk of tainting the person who has the tooth implanted with the disease that may have existed in the person from whom the tooth was originally taken.

Dr. Ottofy: I fear I cannot please our friends by treating of first principles. I therefore merely recite my practice and my observation, and opinion is based upon practice. As to the selection of teeth with pericementum, my experience has been that there are no teeth upon which the pericementum is perfect. In the extraction of a tooth almost invariably the pericementum is ruptured and portions of it remain in the socket. Any of you can readily prove this by soaking a tooth in water. After the pericementum has swollen so that it becomes visible, you will find that certain portions of the pericementum are missing. For that reason I have not endeavored to find any teeth with the pericementum perfect, nor have I removed any pericementum from any of the teeth I have implanted. The first failures that I had were where the antrum was perforated. Following the instructions given by Dr. Younger, I did not trim the roots, but latterly I have found there is no difference between trimming and not trimming. Apparently operations made with roots that have been trimmed are as successful, measured by the time up to the present, as those made with roots that have not been trimmed. I take exception to the opinion that the teeth assume the natural color of the adjoining ones. I have a very positive case to demonstrate the contrary, where there are three implanted teeth in one mouth. The cuspid is white, the second bicuspid is yellow, and the first bicuspid is brown, so that it is unquestionable that they do not always assume the same color. Of all the teeth that I have implanted I do not know the history of any. I am satisfied that implantation can be made successful as far as we can measure it by the time which has elapsed since the first case of implantation has been performed; and, by the way, success is measured, not by a lifetime, but by a few years. We often consider an operation successful which has lasted for a year, and there are patients who are willing to undergo the

operation of implantation once a year in preference to wearing any artificial substitute. An operation may be made successful, if not the first time, the second time, or possibly the third time. I have cases of that kind. In three of them the first tooth had been selected with all possible care and had failed, and the second one was implanted in the same socket with but very little trouble, the patient, in fact, not really undergoing two operations.

DR. MARSHALL: To what do you attribute the success in one case and failure in the other?

DR. OTTOFY: If I knew the cause of the failure, I think I could implant a tooth and tell the patient just how long it would remain. The principal source of annoyance which I have found in cases of implantation, to which no reference has been made, is the crumbling and breaking of the crown. To overcome this I now prefer to implant roots of teeth with Logan crowns attached. There is no reason why there should be any difference between that and a tooth implanted with a natural crown. Implantation is nothing new, because the operations have been performed years ago, but the chances of better success are due principally to our present method of sterilizing the teeth and of course to the perfect filling of the roots.

DR. H. A. SMITH: I care to say but a word in closing. In regard to the statement made with reference to Dr. Younger's methods, in justice to him I think I ought to state that the twenty-six cases he has reported are only those made in his own office and with the utmost care. He did not tabulate those that he made in clinics at New York and elsewhere. These outside cases he states largely outnumber those which he has reported. In regard to what I have presented in my paper, I may remark that the chief value of the report is in the tables. I think the data given will be instructive. You can draw your own conclusions as to the value or permanency of the operation, and it will be an education that far.

SECTION VI.—Continued.

Classification of Typical Irregularities of the Maxillæ and Teeth.

PAPER BY EUGENE S. TALBOT, OF THE SECTION.

THE literature of the etiology of irregularities of the maxillæ and the teeth is meagre, showing that its study has been limited. Scientific investigation in this department has been neglected for reasons that are obvious. In the first place, to come to correct generalizations it is necessary to make extensive observations. Generalizations based on the observation of a few facts are of little value. Few practitioners enjoy opportunities for studying many cases, as the correction of irregularities forms the exception in general practice. To arrive at correct conclusions as to the causes of deviations from the normal it is necessary to take impressions and preserve casts for study, to visit asylums and schools of defective individuals such as the insane, deaf and dumb, blind, and idiots, and to compare such observations with those made of normal mouths. Before the student can crystallize his observations into theories, his studies should extend over a number of years, include a large number of cases, and a comparison of his conclusions with those of others, carefully weighing their objections and arguments.

It will thus be seen that the average practitioner has neither time nor opportunities for such researches, and that only a genuine love for the subject will urge to the toil and patience necessary to accomplish much in this field. A number of cases that came under my observation over ten years ago led me to read all the literature then extant, which was found to be limited chiefly to the correction of irregularities, the causes not having been touched upon to any extent. The asylum for feeble-minded children at Media, Pa., offered an excellent field for study. Irregularities were numerous here. It was natural to ask, Why should irregularities of the jaws and teeth accompany idiocy? A neurotic condition and arrested

brain-centers are invariably found in these cases. These produce excessive development or arrest of development of the skeleton and soft tissues of the body. Why should not the maxillæ and teeth be affected in the same way and asymmetry be produced? The teeth were not found of abnormal size and proportions, but the relative development of maxillæ and teeth was found to be unequal. Observations extending over a number of years in the different asylums of Illinois among the insane, deaf and dumb, and idiotic strengthened this view. Impressions taken during the past eight years, amounting to over eight hundred, together with the large collections of Dr. Farrar, of New York, and Dr. Shepard, of Boston, over two thousand in all, furnished abundant matter for study and comparison. Observation was also made of irregularities of the teeth in individual cases, in a number of which impressions of the mouth were taken every three months and the models compared to note the changes. It was found that in some complex forms of irregularities the teeth subsequently arranged themselves into the simpler forms mentioned hereafter.

As the study of irregularities is a comparatively recent one, the attempts at classification have been necessarily elementary, and the causes that produced variations from the normal have been scarcely touched upon. Particular pains have been taken in these investigations to study into the causes that produced them. It is intended to show in this paper, but more fully in a work now in preparation, that every case of irregularity is traceable to one or more causes, in conformity with the laws that govern the physiological and pathological processes of the rest of the body. There is a constant relation between dentistry and other departments of medicine which needs to be emphasized in this connection,—not relative to mechanical substitutes and appliances, but including physiological, pathological, and therapeutical problems. The laws governing the health and disease of the mouth do not differ from those appertaining to the rest of the body. The correctness or incorrectness of a theory advanced with regard to abnormal conditions may be determined by the application of this test.

All irregularities of the maxillæ and teeth may be traced to the following causes:

I. *Constitutional:* mal-proportion and mal-relation of the maxillæ due to excessive or arrested development.

II. *Local or circumstantial:*

(1) Improper occlusion;

(2) Want of accord between waste and repair;

(3) Neglect of function.

These causes are deviations from the general laws that govern the healthy relation and function of the teeth:

I. A proper relative size of the organs of mastication;

II. A proper occlusion of the teeth;

III. Accord between the processes of waste and repair;

IV. Proper functional activity.

These form the basis of the classification adopted.

In correcting irregularities it is necessary to determine the cause in each case; only in this way can they be successfully dealt with. In this paper an attempt is made to classify irregularities according to their underlying cause, and to explain as concisely as possible the similarities and differences upon which the classification is based.

Such a system of classification not only helps us to get a clearer view of each variety, its cause and best method of correction, but the study of deviations from the normal helps us to a more correct view of the normal jaw. The monstrosities of nature often give a clue to her laws. The study of irregularities has therefore a bearing not only on dentistry, but on anatomy, physiology, related pathological conditions, and also on some questions of sociology.

In order that aberrations from the normal may be better understood, let us first consider the question, what constitutes a normal arch.

There are three characteristics of the normal arch. Independent of temperamental peculiarities, the line extending from one cuspid to the other should be an arc of a circle, not an angle or straight line; the lines from the cuspids to the third molar should be straight, curving neither in nor out, the sides not approximating parallel lines. Absolute bilateral uniformity is not implied in this, as the two sides of the human jaw are rarely if ever wholly alike. A uniform arch necessitates a uniformity of development between the arch of the maxilla and the arch of the teeth, and a correct position of the individual teeth in their relation to each other. When there is inharmony of development between the jaw and the teeth, as may happen when one parent has a small maxilla with correspondingly small teeth, and the other a large one with correspondingly large teeth, if the child inherits the jaw of one and the teeth of the other, irregularities must follow. Such difference in diameter between the arch of the maxilla and that of the crowns of the teeth is a constitutional cause of irregularity.

Whenever there is a difference between these diameters, the line formed by the teeth must fall either outside or within the arch of the maxilla, and irregularities of arrangement result. A local cause is established by a forward movement of the first molar due to premature or tardy extraction of deciduous teeth, or the arrested growth of the ramus or of the lower maxilla. It will be seen by examining each type of irregularity that constitutional causes are not alone responsible, local causes almost invariably co-operating. Hence it appears that there is no propriety in speaking of inherited irregularities of the teeth *per se*. Constitutional and local causes combine to produce the result,—*i.e.*, a maxilla smaller than the diameter of the teeth. A high arch is not the result of irregularity, as has been supposed. This inference might be drawn from the fact

FIG. 1.

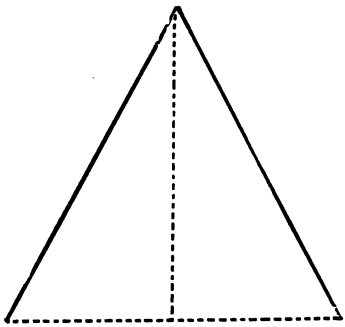
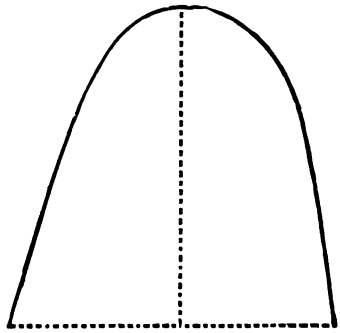


FIG. 2.



that in both of the primary forms of irregularity, the V-shaped and saddle-shaped, the lateral diameter of the arch is contracted. But the high vault is a peculiarity of the nervous temperament, and is found independent of irregularities. If irregularities and high vaults were always concomitants, this inference would appear tenable; but it is more reasonable to suppose that overlapping of incisors to some extent results from a contracted vault than that the contracted vault results from the overlapping. The character of the dome is determined before that of the teeth, for when the permanent teeth make their appearance the dome is pretty well developed. It is therefore reasonable to conclude that a high and comparatively narrow roof are the peculiarities of a type, just as high cheek-bones and a massive jaw are.

The primary divisions of irregularities are the V-shaped and

saddle-shaped arches. We have the V-shaped variety (Fig. 1),* where the apex of a triangle is formed by two incisors, the base of the triangle being a line connecting the two first molars. If because of premature or tardy extraction the first molar moves forward, or the coincidence of the arch of the maxilla and the arch of the crowns of the teeth is disturbed, the arch formed by the crowns of the teeth in trying to accommodate itself to the lesser arch of the maxilla becomes a broken line forming an angle at the incisors. This angle results from two causes,—the thinness of the process at this point and the diminution of resistance which must follow.

Modification of the V-shaped arch results from modifications of the above-named conditions. A difference in the time of eruption of the cuspids, everything else being equal, effects a difference in

FIG. 3.

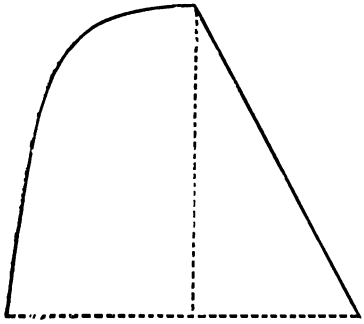
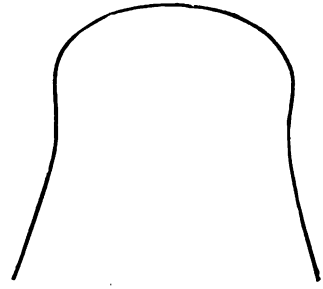


FIG. 4.



the space left for their accommodation, and thus partial V-shaped arches are found. The key-stone, the cuspid, is not entirely outside or inside of the arch in the partial V-shaped form, but may appear partially crowded out of place. Hence the arch is neither a normal curve nor wholly angular, but unites the characteristics of both. Its lateral diameter is less than that of the normal arch, giving it a contracted appearance. (See Fig. 2.) Thus a number of varieties of the fundamental forms of the V-shaped arch are formed, differing in degrees of anterior contraction. All of these result from the comparative thinness of the anterior portion of the process offering but little resistance, an abnormal pressure from behind, and the greater strength of the cuspids, which causes them to seek room

* While the general outlines of the jaws and teeth are the same, in no two cases are they exactly alike. The cuts therefore are not drawn from actual cases, but are ideal diagrams of typical cases.

irrespective of the space left for them. When one side of the process near the symphysis is the stronger, thus affording greater resistance, or the pressure from the cuspid is less, that side may maintain its normal relations while the other may give way to conditions resulting in a V-shaped contraction. The curve will then be broken, not at the apex of the triangle, but near it; the incisors will overlap, and when pressure from the cuspid acts on the weaker column it must give way. This results in the semi-V-shaped form. (Fig. 3.)

When the permanent bicuspids erupt under favorable conditions, so that their greatest diameter is in a line with the greatest diameter of both cuspid and first molar, they will be held firmly in place, since the greatest pressure is on this very line. On the other hand, when the bicuspids are erupted *after* their proper time while the cuspids progress duly, the cuspids meeting with no resistance fall into their proper places, but the bicuspids adapt themselves as best they can to the space left for them, and if the arch of the maxilla does not coincide with that of the crowns, they must fall within or without the arch. Now if the first molar has moved forward, diminishing the space, the bicuspids must erupt either within or without the arch.

To understand why they are generally found within the arch, the shapes of the molar and cuspid must be kept in mind. A transverse section of their crowns shows their proximal walls not to be parallel but wedge-shaped, their diameter being greater on the buccal than on the palatal side. When the crowded bicuspids fall within the greatest diameter of these teeth, finding more room within the arch, they naturally slip in the direction of least resistance,—*i.e.*, toward the palate. A local cause for the same condition is found in the fact that the crowns of the bicuspids before their eruption are imbedded in the roots of the temporary molars, and as these form an arc of a smaller circle than that of the permanent teeth, the bicuspids will be found generally inside the arch. From both causes we have an inward curvature, which results in what we term the saddle-shaped arch. (Fig. 4.) It should be noted here that while the V-shaped irregularity is found anterior to the cuspid, the upper incisors always projecting beyond the lower, the saddle-shaped irregularity is invariably posterior to the cuspids, and the bicuspids form an inward curve. The incisors never project. Both forms contract the arch, the V-shaped anteriorly, the saddle-shaped posteriorly. In both forms the forward movement of the first molar is the local cause. When the unfavorable conditions that result in the saddle-shaped arch are not so pronounced, we have the partial saddle-

shaped arch. Thus because of the greater uniformity of the maxilla and of the arch of the crowns there may be more space, and the bicuspids may be forced but little out of place, or the molar may move forward but slightly, interfering less with the bicuspids. Sometimes it happens that in trying to adjust themselves to the

FIG. 5.

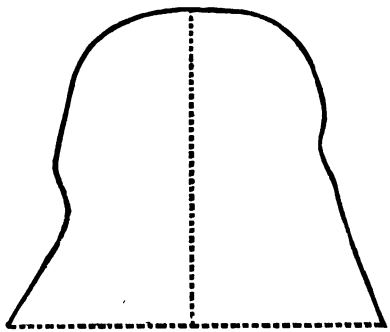
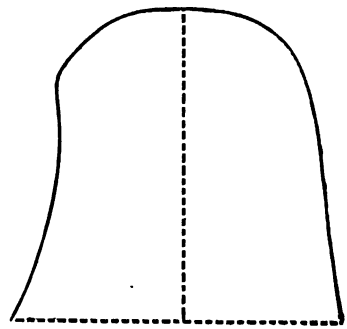


FIG. 6.



limited space one bicuspid may be crowded outward and another inward. Sometimes the first bicuspid is in, more frequently the second. (Fig. 5.) As has been stated before, this could not take place if the greatest diameter of cuspid, bicuspid, and molar were in the same line, but the diameter of one of the bicuspids may be in a line with that of the adjoining tooth while that of the other is

FIG. 7.

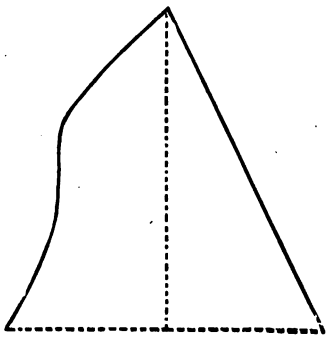
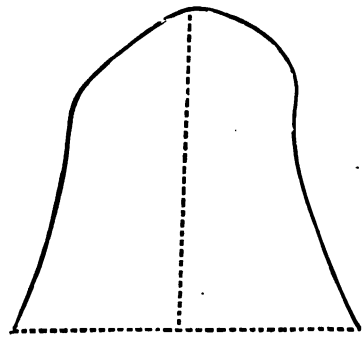


FIG. 8.



not, and then one is pressed along the line of the least resistance. As in the case of the V-shaped arch, one side of the mouth may be normal because of the absence of any local condition interfering with the space. One temporary molar may have been extracted, allowing the permanent one to move forward while the other re-

mains in place. The result which follows is an asymmetry of lateral halves termed semi-saddle-shaped irregularity. (See Fig. 6.)

How the V-shaped and saddle-shaped arches on one side only may be produced has already been described. How they may be combined on one side remains to be explained. Given thinness of process in the anterior part of the mouth, premature or tardy extraction of the cuspid, and there will be a forward movement of the incisors. The development of the cuspid will press the alveolar process inward, thereby contracting the arch, and the tardily erupted bicuspids will adjust themselves to the limited curve as before stated. In this way the features of the two forms are combined; that is, a contracted or angular anterior arch, and a posterior arch that is more or less concave. The opposite side may be V-shaped, saddle-shaped, or normal. (Figs. 7 and 8.)

DISCUSSION.

Dr. Barrett: I am glad to note the presentation of a paper which attempts to classify the different kinds of irregularities of teeth and to consider their origin, for until we apprehend their etiology we are unable intelligently to deal with anomalous phases. But it seems to me that the causes which have been presented here do not cover the whole ground. My attention has been brought directly to some causes that do not seem to fall within the scope of this paper. I have been surprised to notice the number of instances in which the bite has been "jumped,"—that is, instead of the occlusion being normal, the teeth of the upper jaw are advanced one or more spaces. Or perhaps the lower teeth are the ones that are protruded, and the upper cuspid, for instance, instead of falling between the lower cuspid and first bicuspid, is found in advance of the lower cuspid, or, on the other hand, between the two lower bicuspids, thus producing great deformity and irregularity. I believe this to be often due to improper treatment during the time of the formation and development of the teeth, perhaps to the premature or too long delayed extraction of the deciduous teeth. The former of these causes is much the most common, because it interferes with the normal development of the alveolar process, and because the latter seldom produces an irregularity which is not spontaneously corrected if sufficient time be given for nature to do the work. If, as one should always do, we take articulated impressions of both the lower and upper teeth, and advance or retract the upper cast upon the lower

one, it will be seen that the whole arrangement of the teeth becomes normal at once: they fall into their proper spaces, and the broadest part of each jaw being brought into its proper relative position, there is no need of expansion of either arch. All that is required is that the bite should be "jumped" back again, by means of the proper appliance, when that is possible.

I believe that the lack of development of the alveolar process through too early extraction of the deciduous teeth is chargeable with very much of the irregularities to which young people are subject. We do not find any very great amount of irregularity in the teeth of pre-historic people, because they did not then have any way of extracting teeth which were firm in the jaw. I have been particularly struck with this in the course of the examination of the teeth of pre-historic people, which I have for some years been engaged in. In the thousands of such jaws which I have had the opportunity to examine, it is remarkable that the roots of the teeth always remained until they were either extruded or entirely disintegrated. There is no evidence of extraction by violence at any age. Until it was possible to remove teeth or roots with the unaided fingers, they were allowed to remain, whether deciduous or permanent, and I do not know that I ever saw a case of the "jumping" of the bite in the jaws of any of the pre-historic races.

Dr. Curtis: Dr. Talbot's paper is one that should be discussed very freely and quite fully, though I feel that we are not sufficiently educated in this direction to properly consider it. It is a subject comparatively new to the profession. By invitation of Dr. Talbot it was my pleasure to examine, in company with Dr. Palmer, of Syracuse, the mouths of several hundred idiots, and the subject became very interesting to me; and while I have not gone into it thoroughly, I have considered it to some extent, yet cannot discuss it as I would like. I will call attention to one thing omitted in the essay, and that is the well-developed appearance and the regularity of the inferior jaw and teeth in the several classes of cases shown here on the charts and described in the paper.

Dr. P. T. Smith: I was interested in listening to the paper that so ably delineated the classification of irregularities or deformities of the dental arch. It will be very valuable in the future for reference. So far so good, to know that these things do exist and that they fall under our notice very frequently. But that seems to be the extent of the information set forth by the paper which has been read and the drawings that illustrate it. What is the cause of these

difficulties is the question which most interests us, and how are we going to arrive at that and apply a remedy for its prevention?

All force that tends to the development of an organism of whatever kind is a part of the substances of which this organism is created, and yet in all histological and physiological questions we do not find that point considered. We are not taught by any of our text-books to understand that there is but one thing to be considered in all these boundless questions. It is the substance *per se* that we are led to know about, and that is as far as it goes. We never can successfully and intelligently compete with the difficulties that beset us along the way of life and in the performance of our duties as pathological practitioners unless we understand all the forces that are responsible for these peculiarities. We are told by the essayist that in the asylums for the demented he found a greater proportion of deformities than in any other class of life.

That corresponds exactly with the fact that there is something wrong with the producing cause. It would not do to say, after an architect had erected a beautiful structure which attracted the attention of all passers by, that it had produced itself, that all the inanimate substances that went to construct it had crept into their respective places. The inanimate substance, the earthy material of which our organism is created, has had no more to do with the selection of the place it shall fill, no more to do with the selection of the office to be performed within our organism, than the bricks and mortar of the edifices that we build. What is it that produces these various results?

It is a substance, as veritable a substance as the material which our eyes can behold; and it is the power that controls the element that produces a perfect symmetry in the growth of man or any other organic structure, be it vegetable or mineral, which is organic, although we are taught to say it is inorganic.

Until we invade this forbidden field that scientists have been shut out from, unless we make ourselves acquainted with the forces, from effect to cause, how can we consider this important question that has been illustrated this morning? It is the cause we have got to discover, and in discovering the cause we may apply the remedy. We cannot educate ourselves any further, neither can we educate those who are depending upon us for information which we would be glad to impart and for which it is our duty as professional men to search, unless we acquaint ourselves with these imponderable forces. I ask your attention to this important part of the

question; and if there has been a committee appointed in pursuance of the resolution offered by Dr. McKellops, to investigate, in connection with the Illinois Society, the deformities of skulls, they ought to take this into consideration. Individual peculiarities and deformities do not commence at childhood, do not commence at conception; they commence beyond the pre-natal life. Unless we understand the forces and philosophy of this subject, we are making a great mistake to jump down in the middle of a question and consider it to its terminus.

Dr. Talbot: I have nothing to say in closing the discussion on this subject. I propose to place these models in the Army Medical Museum at Washington, and they will be kept there for the benefit of the dental profession.

SECTION VI.—Continued.

Tabulation of the Condition of Pre-historic Crania.

THE Illinois State Dental Society appointed at their last meeting in May, a committee for the purpose of securing a fund wherewith to defray the expenses of the careful examination and tabulation of the condition—from a dental stand-point—of all of the pre-historic crania now in the United States.

Upon inquiry the Committee has ascertained that there are more than twenty-five hundred crania of the different peoples of various portions of the world in the museums of this country. No extensive systematic examination of these crania by scientific dentists for dental purposes has yet been made, though the sciences of ethnology, archæology, comparative anatomy, and evolution have been enriched by the stores of information contained in these silent historic remains of the past.

The Society has not fully determined in what manner, when, or by whom the work should be done; but as soon as a sufficient sum is guaranteed to justify the undertaking the details will be arranged. Up to the present writing a number of societies have appropriated money for this purpose. The following-named societies are known to have appropriated the sums mentioned: Illinois State Dental Society, $100; Kentucky State Dental Association, $50; California State Dental Association, $50; Georgia State Dental Society, $25.

It is contemplated to examine these crania (and permission to do this has already been secured from most of the museums) in every possible light in which they may relate to our science. The teeth are to be examined to determine the extent, location, and character of the caries, if any, the prevalence of abrasion, erosion, alveolar abscess, and all other dental diseases which may have left some mark upon the hard structures. It is intended to make full and thorough inquiry into the subject of dental anomalies, irregularities, the extent of dental operations, consisting of extractions, fillings, or of any other opera-

tions of which traces may be visible. In short, it is the desire of this Committee to secure as a result of this investigation *all the information bearing directly or indirectly on dental science.* The result is to be published freely under the auspices of the societies contributing.

The Committee believe that nearly two thousand dollars will be required to perform the work in a manner befitting its importance, and ask to be guaranteed such a sum as the Section may recommend and the Association may see fit. Two hundred and twenty-five dollars are now subscribed, and it is contemplated to secure the remainder from the various dental societies of the United States.

LOUIS OTTOFY, *for the Committee.*

DISCUSSION.

DR. MCKELLOPS: I have listened with a great deal of attention to the paper, having been much interested in this subject for a long time. Some years ago at Cincinnati this question was brought up and two hundred and fifty dollars were appropriated, but afterwards the motion was reconsidered and tabled, and then the Illinois State Society took it up and there it went by the board. This is a matter that belongs entirely to this Association and is of great importance, but it requires a great deal of care in handling, for it is a hard matter to get the privilege of examining the skulls throughout the United States, and the members selected for that important duty would have to be pretty well known before they could get permission. I move that a committee of five be appointed in this Association to act in concert with the Illinois State Society in relation to this matter. These gentlemen should have the power to select two or three persons for this very important business.

DR. H. A. SMITH: I move as an amendment that the sum of five hundred dollars be appropriated for the purpose of carrying out this work. I agree fully with Dr. McKellops as to the importance of making the investigation, but I would not agree with him that it belongs to this society alone. That the influence of the Association would give us access to those collections of crania which are choice and somewhat exclusive may be true. However, if other dental societies who may have begun similar investigations prefer to do their work independently, it might be well. When we have perfected a scheme, or are ready to state just what we want to find out, then we will be in a position to invite co-operation. Effort will

be made to have these investigations so carefully and thoroughly done that there will be no need to ever go over the same ground again. Money spent for this purpose will be simply carrying out the objects of our Association.

DR. BARRETT: I desire to suggest still further amendment. I support the appropriation, but think the work should be done and the money expended under the direction of the proper Section, which I believe is Section VI.

Perhaps the most pathetic words of a great comedian. in his portrayal of that affecting vagabond, Rip Van Winkle, are these: "And are we so soon forgotten when we are gone?" Six or seven years ago I spent some weeks at Cambridge, in the museum of archæology there, engaged in an examination of about two thousand pre-historic skulls. I did not do the work as thoroughly as I desired, but I made three journeys there for that express purpose, and I published the results of the whole examination. I believe that up to that time there had scarcely been a meeting of the American Dental Association in which it had not been urged that caries was due to our sins; to our altered habits of life; to our manner of preparing and cooking our food; and if we would only go back to that aboriginal state of nature, that blessed condition in which they asserted there were neither diseases nor doctors, we should find no caries of the teeth. The results of my examination indisputably proved that twenty-five hundred years ago the people then living suffered from caries very nearly to the same extent as to-day. The paper which I then prepared was published in the *Independent Practitioner* of October, 1883, and it attracted considerable attention among thinking men. Harvard University ordered fifty copies of the reprint, and a number of the professors evinced a warm interest in the subject, and wrote me that they were satisfied with the proofs submitted. It was certainly enough to close out those theorists among us who had taken a thing for granted, and accepted without proof a hypothesis which harmonized with their preconceived ideas. Without the slightest attempt to sustain by observation what was easily proved or disproved, it had been a common practice, year after year, to assert upon this and other floors that in the early days caries was unknown. A declaration more false it would have been difficult to make, and from the time of the publication of my paper no such assertion has been made to my knowledge. The man who would to-day claim that dental caries is modern in its origin would exhibit an ignorance which would not be condoned by

his associates. I have in my possession and have exhibited before this Association jaws and teeth which were three thousand years old, in which the teeth were as badly decayed as are the teeth of to-day, and now I am told that the subject has never received any attention at the hands of dentists. Great Heaven! what is the use in working when one is so soon forgotten, and of what value is knowledge that is so entirely ignored?

DR. H. A. SMITH: I think many of us remember and admire the work done by Dr. Barrett; but in addition to the investigations in regard to the etiology and frequency of dental caries another feature is to be taken up, the formation of the jaw and the changes that have taken place from pre-historic times in inducing irregularities in teeth.

DR. BARRETT: That was a branch I covered as completely as I could, by stating that so far as the record of those skulls went there had been no change.

I move as an amendment that this be referred to Section VI; then we will have a proper channel for the disposal of the money, and we shall have established a proper precedent for the future.

DR. MCKELLOPS: My object was not to interfere with the Section, but to bring this matter properly before this Association. The Illinois State Society has gone to a great deal of trouble in respect to this, and I do not think it would be right to take it out of their hands; and therefore I have made the motion to appoint the committee.

SECTION VII.

ANATOMY, PATHOLOGY, AND SURGERY.

Lesions of the Dental Branch of the Fifth Pair of Nerves.

PAPER BY TRUMAN W. BROPHY, CHAIRMAN OF THE SECTION.

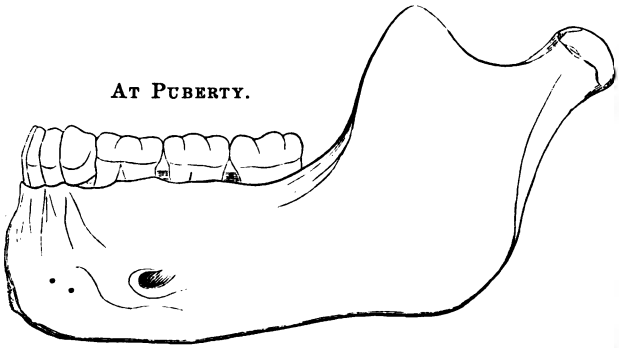
THE writer's object in this paper is not to discuss the pathological conditions of the dental pulp and their sequelæ, but to call the attention of the Association to some of the remote causes of trigeminal neuralgias, which are usually sought to be remedied by surgical procedures, and to point out some of the more frequent nerve-lesions which are not dependent upon the teeth for their origin.

The second and third divisions of the trifacial nerve proceed from the Gasserian ganglion, and, after passing through their bony canals, have their exits at the infra-orbital and mental foramina respectively. The terminal branches of these nerves, making their exit through small foramina at points quite liable to external violence, form an important factor in the consideration of the subject. Injuries to the first and second divisions of the trifacial nerve may be constitutional or traumatic. The principal constitutional causes that produce morbid conditions in this set of nerves are gout, rheumatism, malaria, and syphilis. Any of these may produce functional disturbances of the nerves, accompanied by interference with the general nutrition of the nervous centers or by disorders from reflex action.

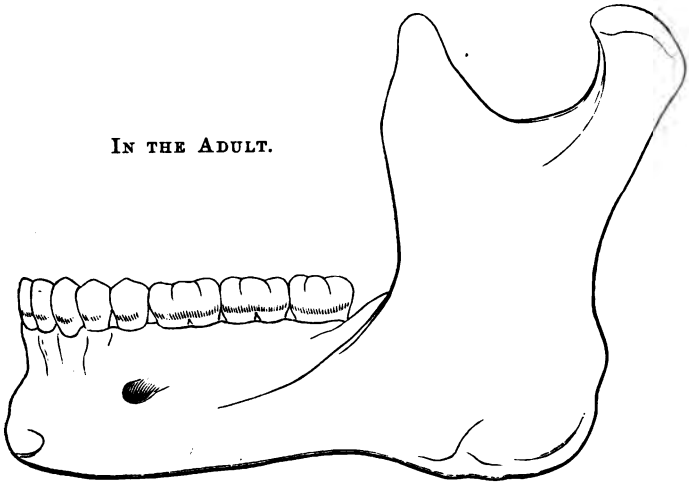
Traumatic causes may be numerous. Thus, nerve-fibrils caught in the cicatrices after the extraction of a tooth or more extensive surgical operations can produce sufficient irritation to cause intense neuralgic pain; the pressure of an exostosed tooth upon a nerve may produce severe pain, as may also spiculæ of bone, or particles

AT BIRTH.

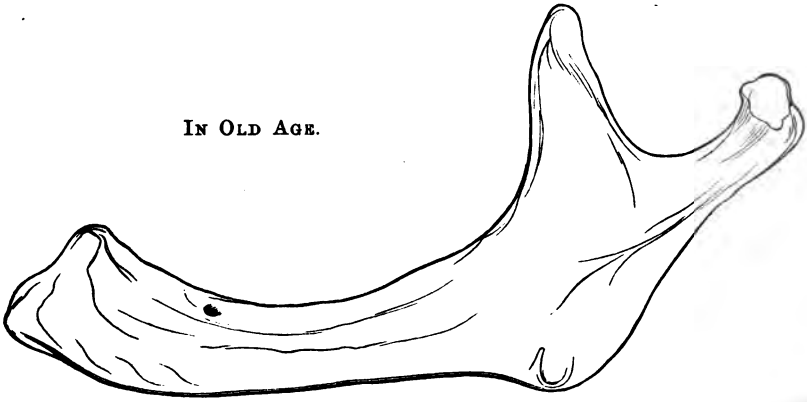
AT PUBERTY.



IN THE ADULT.



IN OLD AGE.



of friable foreign bodies imbedded in their substance, or the pressure of an artificial lower denture upon the terminal branches of the inferior dental nerves. These and many other causes may produce neuralgic pains varying in intensity according to the idiosyncrasies of the patient and his climatic environment.

With reference to persistent neuralgia caused by the pressure of lower dentures, and occurring more frequently among aged persons, I desire to relate a case which recently came under my observation: A female, aged sixty, complained of darting pains in the right side of the face, which had their origin at the terminal branches of the inferior dental nerve. Upon examination, I found the tissues about the mental foramen in a state of hyperæsthesia, and digital examination revealed a marked and decided enlargement of the nerve at the mental foramen. The history of the case revealed that the patient had suffered acutely from pains, neuralgic in character, since the introduction of a lower denture some seven years prior to my seeing her. I diagnosed a neuroma of the inferior dental nerve induced by persistent irritation from pressure of the lower artificial denture, and decided upon the exsection of the nerve. I will say, however, that she had during the course of the seven years consulted and been treated by various physicians without relief.

At the operation, during which the patient was etherized, a section of bone extending backward from the mental foramen about one inch and a half was removed, when the mental foramen was found upon the summit of the ridge with nerve hypertrophied and nodulated outside of the foramen. The nerve was removed as far back as the ramus, after which with a bud-shaped bur I reamed out the canal and surrounding tissue so as to secure, if possible, a deposit of osteoblasts within the canal, which, by organizing, would fill the canal and prevent a re-formation of the nerve and a recurrence of pain. After packing the cavity with iodoform, the patient was dismissed. The operation was made within the mouth. I have not in any case found it necessary to make an external incision in these operations. She complained of no pain, and was comfortable for six weeks, at the end of which time the pain returned. I then decided to remove the remaining portion of the nerve, and, after hypodermically injecting cocaine beneath the soft tissues surrounding the inferior dental foramen, seized the nerve with a tenaculum at about the point of entrance into the foramen, brought it forward, and severed it from its trunk, thus removing all that remained in the canal. Absence of pain followed this last operation a long period, but when I last saw the

patient she was suffering from pain in the tongue, indicating that the lingual branch was affected likewise.

In addition to the constitutional causes previously mentioned, the origin of neuralgic pain may reside within the cranium or the brain itself, and in such cases is not, with few exceptions, amenable to surgical treatment. Numerous cases of multiple neuromata are on record. In one case recorded by R. W. Smith, upwards of two thousand tumors were found. In most cases they are found in one set of nerves. Dr. Wilks reports a remarkable case of multiple neuromata, supposed to be of syphilitic origin, where fibroid was found within the neurilemma. According to Anstie, women during utero-gestation, exhaustion from hemorrhage at parturition, menorrhagia, and the sexual changes of middle life are especially prone to facial neuralgia; but, as he says, it is during the period of degeneration that the worst and most intractable examples occur.

Cold winds, and especially those laden with moisture, are among the most common exciting causes of facial neuralgia. Injury of the nerve within a bony canal, such as may occur in the extraction of teeth, may act as an exciting cause of neuralgia. Tumors, abscesses, aneurisms at the base of the brain, may be the immediate cause, and a spontaneous outburst may occur at any time without any previous warning. The paroxysms may be of short or long duration. When well pronounced, the slightest irritation, such as the slamming of a door, sneezing, coughing, or laughing, is sufficient to produce paroxysms severe enough to make the patient fairly tremble under the violence of the pain.

When the superior maxillary division is involved, intense pain is experienced about the infra-orbital region, accompanied usually by profuse watery discharges from the buccal and nasal mucous membrane; lip and nostrils sensitive to touch, with acute pains in parotid gland and teeth, accompanied with excessive flow of saliva.

Diagnosis: The severity of the pain in the facial region, if accompanied with tenderness to pressure, is sufficient to conclude that we have neuralgia with which to deal. The only differential diagnosis is tumor at the base of the brain. The semi-circular net-work of nerves about the antrum is not infrequently the seat of neuralgia when that cavity is in an abnormal state. Pulp-nodules and carious teeth may be exciting causes.

Treatment: The treatment of this severe lesion is largely palliative, the hypodermic injection of morphia being the most popular palliative agent employed. Surgically considered, however, the

stretching of the nerve has proved a potent remedy. The central portion and peripheral ends are stretched with considerable force, which is followed by cutaneous anesthesia from which the most beneficial results are obtained.

In conclusion, let me say that we should seek and give to the profession the results of persistent investigations. We need a stimulus in this direction, and it is to be hoped that members of this Association will give it the attention its importance demands. As to the surgical aspect of the question, the writer is not prepared to say that it is the best treatment to be pursued in all cases. It is his opinion that only when medicinal treatment has not succeeded and when the disease has become unbearable is exsection indicated, and that surgical procedure at best is not invariably reliable to effect a permanent cure, but is a palliative agent which brings relief only for a time, varying in length according to the intensity of the disease and the idiosyncrasies and environment of the patient.

DISCUSSION.

Dr. M. L. Rhein: In reference to Dr. Brophy's remarks about the treatment of neuralgia, and especially the advocacy of administration of morphia, I desire to put in an objection. It is now about four years and a half since Débove, of Paris, first introduced to the nervous specialists of France *chloride of methyl*, not only for palliating all forms of neuralgia, but for the purpose of accomplishing an absolute cure in the majority of cases. Its early use was confined principally to the treatment of sciatica. The enthusiastic claims of Débove have been more than corroborated since then by the most eminent French specialists in nervous diseases. The wonderful effects are produced by the sudden and intense reduction of temperature caused by the rapid vaporization of the chloride of methyl when exposed to the atmosphere. Within a few seconds it will produce a reduction of temperature equivalent to —40° to —50° Fahrenheit. It can be used with the utmost safety; out of seventy-six cases in which I have used it since last February I have not a single bad result to report, though in some few cases it did not produce the desired therapeutic benefit; still in every case of trigeminal neuralgia in which I have used it the result was immediate relief from all pain. This remarkable statement is borne out by every writer on the subject, and it certainly ought to change our entire practice in the treatment of neuralgias. If the sufferings of neuralgia can thus be immediately relieved, is there any excuse for resorting

to morphia or nerve-stretching? There are numerous recorded cases of nerve-stretching, and even removal of the affected nerve, without benefiting the patient, in which the subsequent application of the chloride of methyl entirely cured the neuralgia. The only theory that explains this wonderful effect is that in these cases the neuralgia does not proceed from the nerve-fiber itself, but emanates from the small nerve-filaments called the *nervi nervorum*. The application of such intense cold seems to paralyze the small fibrillæ and thus cure the neuralgia.

DR. MARSHALL: Dr. Brophy, in speaking of the surgical means of treatment, left out one very important method of treating these cases, namely, that of evulsion. He spoke of exsecting the nerve, he spoke of stretching, but he said nothing about evulsion, which is the tearing out, as far back as possible, of the nerve-trunk. This method I think was introduced by a French surgeon (whose name I cannot remember) some years ago. It has been practiced for the last four or five years at Mercy Hospital, in Chicago, with the very best results. The cases that I have seen Prof. Andrews operate upon in Mercy Hospital so far have been a perfect success. I will mention one case in illustration. He had operated three different times by stretching and by exsection upon a lady about fifty years of age. After each operation, in from six to seven months the disease returned. He then said he would try the process of evulsion, which he did, making an incision directly under the eye, lifting the eyeball and cutting through the canal, getting hold of the infra-orbital nerve and pulling it hard, and taking another forceps and reaching still further and getting hold of it and twisting it upon the forceps until it broke loose. He operated upon the same patient for the superior branch over the eye, extracting it in the same way. That case I saw two years afterwards, and there had been no return of the disease whatever; and in several other cases which he has operated upon he has had as good results as in this one particular case. I mention this because I think it is a valuable principle in such cases.

DR. P. T. SMITH: I would like to relate one case of neuralgia that occurred with me which seemed to have a peculiar cause. A lady about thirty-five years of age, in apparently good health, suffered severe pain in her left shoulder, extending sometimes from that point up the line of the neck and down as far as the elbow. These paroxysms would last sometimes for two or three hours in the most severe manner. At other times they were lighter and gave less

annoyance, and sometimes would last but a short time. Treatment by her family physician and others called in consultation failed to give her any relief. She then applied to a dentist under the direction of one of the physicians. I examined her mouth, and every tooth seemed to be in a healthy condition with the exception of a few on that side of the face, which contained small gold fillings. There was a slight exposure of the palatine root of the first molar on the right, exposing some of the dentine, and I thought the seat of the disease might be at that point. I took her to another dentist for consultation, and he concluded that I was wrong. Two months after the consultation, while she was in my office, she was seized with one of these terrible paroxysms which almost crazed her, though it was no worse than she had suffered many times. I resolved to bore into the root at this point of dental exposure, which I did, and the relief was almost instantaneous. There was suppuration, and by letting out the pus and gases immediate relief followed. I excised the root and made a good healthy tooth, as good as could be without a nerve, and I had the pleasure of seeing that lady not more than three weeks ago in the town where I now live, eighteen years subsequent, and that tooth has been doing valuable service all these years; and since then I have excised both the buccal and lingual roots of many molars for similar cause with great satisfaction.

Dr. Brophy: All that I have to say in conclusion is to call attention again to the condition of the inferior maxilla in advanced years, and to impress upon those who are adjusting artificial dentures that it is a matter of great importance to examine the parts to see whether the inferior dental nerve is enlarged at that point, or in any event to so construct the denture that it will form a saddle over the foramen.

This case that I have narrated is by no means the only one of the kind that has come under my observation. It is not the only one in which I believe that artificial dentures have excited this disturbance of the nerve, nor is it the only one that has produced hypertrophy of the nerve, leading to quite serious and permanent derangement of its functions. It is an easy matter to place the hand on the thin flattened bone as it is in very advanced years and determine whether the nerve is enlarged at that point; or, in other words, to determine just where the foramen is and cut out a portion of the plate, so that the plate will not rest solidly upon that highly sensitive structure, the inferior dental nerve.

SECTION II.

DENTAL EDUCATION, LITERATURE, AND NOMENCLATURE.

REPORT BY LOUIS OTTOFY, SECRETARY OF THE SECTION.

THE Section on Dental Education, Literature, and Nomenclature begs leave to submit the following as its annual report:

The number of dental colleges at the time of the last annual report was twenty-nine. This number was increased during the year by the establishment of a college of dentistry in connection with the University of Denver, Colorado, and by the establishment of the German-American Dental College of Chicago, to thirty-one.

At the commencements held* since the last meeting of this Association seven hundred and ninety-six persons were graduated from the dental colleges of the United States, an increase of fifty over the preceding year, making a total of two thousand six hundred and forty-two graduates for the last four years (1886–7–8–9).

One of the vital questions engrossing the interest of the profession was the practical application of post-graduate instruction in a number of American dental colleges. The aim of these courses of instruction was keenly appreciated by those who participated in them. Undoubtedly in the future much good will be accomplished in the way of educating those who by the unfortunate intervention of unfavorable circumstances were deprived of a proper preliminary or professional education.

The most vital question, however, relating to dental education at present is that looking to uniformity of the courses of instruction and extension of the length of the individual sessions, as well as compulsory attendance on three full courses of lectures before graduation. Inquiry among the schools two years ago elicited the

*Twenty-six colleges have reported, one has held no commencements, being a new school, and from two colleges no report could be secured.

fact that a good deal of opposition existed to a resolution requesting the increase of the school year to nine months. Many of the objections raised were valid, and it was found that in some of the schools—especially in those connected with medical colleges—the increase of the school year was impracticable. Hence this Section last year recommended the increase of the school year to at least seven months, while it was satisfied that eventually three years' attendance of nine months each must and would be required.

While just on the verge of seriously urging this Association to insist that the standard of dental education be three years of nine months each, the following appears in the annual announcement of one of the three-year colleges:

"The Faculty of this college have decided to extend the college term to seven months in each year. But inasmuch as the National Association of Dental College Faculties and the State Board of Dental Examiners do not require a three years' college course of instruction to qualify to practice, and inasmuch as a large class of worthy young men are debarred from obtaining the advantages of an extended college course of instruction by reason of their lack of time and funds to pursue such a course, it was decided to meet this want by arranging a *two* years' graded course of instruction. While the Faculty of this college would recommend the three years' course, they are fully aware that it entails too great a burden to be borne by many worthy men, who cannot avail themselves of such a lengthy course of instruction, however much they may desire it. Therefore, to meet the want of such students, the Faculty have arranged a two years' course."

It is painful to chronicle a backward step, although undoubtedly the institution is justified in pursuing this course while "the fences are down all around."

The Section heartily indorses the action of the few dental colleges which maintain (or expect to do so, beginning this fall) a three years' course of nine months.

In the light of the recent action of the National Association of Dental Faculties, it may be interesting to read the following resolution, which the Section had decided to recommend for adoption:

Resolved, That it is the opinion of the American Dental Association that, beginning with the scholastic year of 1890–91, all of the dental colleges of the United States increase the course of study to a three-year graded system of not less than five months each.

While some dental colleges may not be conducted strictly for the best interests of the profession, there are now no bogus colleges in the United States.

In view of the fact that the dental journals print lists of books and

carefully prepared reviews of the most important of them at brief intervals, it is not deemed essential to further mention the subject under the head of Dental Literature.

There is nothing to report in regard to Dental Nomenclature, as very little can be done unless the subject is considered by some international organization.

The Section reports the following papers: "Some Thoughts on Education," by Dr. Chas. B. Atkinson; "Oral Surgery and who should Perform it," by Dr. M. G. Jenison; "The Necessity for Independent Dental Journalism," by Dr. Louis Jack.

DISCUSSION.

Dr. Marshall: Reference was made in the report to a college which had dropped from a three years' to a two years' course. That was the University College of Chicago. In reference to this action I would say that it was a mere question with us whether we should have all the glory and the other fellows all the money, and we decided to divide the glory with them. However, we have not abandoned our three years' course, nor do we expect to. The only students we have in our institution to-day, in our graduating class, have been with us from its commencement.

Our faculty found themselves obliged to go very deeply into their own pockets to keep our institution running, but have decided that hereafter they cannot continue that course,—that it would not be fair or just,—and so have changed the course to meet the wants of young men who ask for a two years' course.

We have labored earnestly in the Association of Faculties to get a three years' course adopted, and are very glad that it has at last been accomplished, and we shall wipe out that two years' business just as quickly as possible. It was only adopted for self-protection.

Dr. Ottofy: In corresponding with the various colleges during the year, I have found that the interest in the question of post-graduate study seems to increase among them, and in the West I think the matter will assume considerable importance, because there are more uneducated dentists there than in the East. A society has been formed of post-graduates whose object it is to combine with non-graduates who are unable to get into this body, and I believe a great deal of good will be done by an association of that kind. It was organized during the year, and has held one meeting. I consider that as one of the important steps taken during the year in the matter of dental education.

SECTION II.—Continued.

Some Thoughts on Education.

PAPER BY CHAS. B. ATKINSON, OF NEW YORK.

IN looking over the field of preparation for any walk in life a prominent feature presents itself. *Studentship*, in special schools, seems but preparatory to a *practical* education.

Doctor means teacher, but how many holders of diplomas are competent to fulfill the expectation of a degree? The inadequacy of college instruction to meet all the demands of practice is shown in the increasing number of post-graduate schools. Were the collegiate courses sufficient to prepare *teachers*, as their degrees imply, a post-graduate course ought to be unnecessary.

In our department of effort a great diversity of method *and* so-called fact are taught. This might be greatly helped through a frequent interchange of methods and discussions of principles by the associated college faculties. They undertake to supply the needful instruction, and take money therefor. Should not they be able to turn out competent teachers, to whom a post-graduate course would be unnecessary?

A more uniform curriculum would be encouraged by their communion, and students in general would reap the advantage of all opportunities, discoveries, and late methods in whatever school they should matriculate. The instruction now given is too frequently personal with the professor, and a strife to uphold a theory and gain adherents thereto too often maintained, rather than a clean effort to advance the quality of instruction, whatever the source of the improvement. There is a good effort in this direction, in the establishment of corps of lecturers, who (were they untrammeled by warnings against statements antagonistic to the teachings of the faculty) could bring a strong element of diversity and novelty into the course of instruction, and would serve some of the purposes of post-graduate instruction.

Recommendation has before been made to increase the time for under-graduate study. The practicalizing of what is taught is where our college courses fall short, more especially in preventive dentistry, diagnosis of surgical aspects, and operative surgery.

The public do not need *more* dentists so much as they need *better* dentists; and the practical remark made by a college professor—practical from the stand-point of his pocket, as it affected the fees—to the effect that students cannot afford to spend three years in college, and two are enough, as the expense of the third year, if made compulsory, would bar many from embracing the profession, shows, in one of its aspects, why we are mortified at the number of indifferent graduates we meet. We have passed the need for such men; and this is not confined to dentistry, but *all* professions are crowded with partially educated holders of degrees.

The preliminary and junior examinations help toward this improvement; and with an increase of time to full three years, or more, of infirmary practice, more time being given to surgery and the investigation of the antecedents of the local manifestations of disease, all infirmary work rigidly supervised, and with lectures at least six months in each year, and exhaustive yearly examinations required for advance to succeeding classes, *doctors* might be looked for to whom post-graduate schools could offer slim inducement.

It is true that some of our best men hold no degree, but are nevertheless doing good work in preparing students for practice. But these were and are *earnest* workers, ambitious to learn all they could, and the very absence of documentary indorsement urged them to extra discrimination, care, and faithfulness. We owe them much.

The ideal post-graduate school is a society holding frequent meetings and clinics. This all could find time for, and the reports would accumulate a text-book constantly fresh and up with the most recent advances. A dental union has been recommended as meeting this need, and its scope freely sketched. Reference is made to a paper read by the chairman of Section II, at Boston, in June last. A suggestion was then made that dental colleges might be State institutions, thereby relieving the chairs of the pressure that moved the professor previously referred to. This last, especially, requires serious consideration. Three needs are advanced:

First, a dental college association, to which all faculties belong, meeting at least twice a year, with the avowed purpose of harmonizing all educational effort with the best old and new attainment.

Second, extension of studentship to full three years; six months in each year to be devoted to lectures, with yearly examinations, exhaustively covering the previous course, as a requirement for the student's advancement to succeeding classes; the full three years

to be devoted to infirmary practice under rigid supervision. A strong element of improvement, in examinations, would be brought out through special boards of examiners, before whom all graduates should pass; these boards to meet and harmonize their action to the latest status of the profession. Increase the fees if necessary. A *good* thing is worth a good price.

Third, dental unions, holding monthly or more frequent meetings, and maintaining infirmaries, where complete facilities for clinics are always at hand, which, under the management of efficient executive and clinic committees, should supply every opportunity a post-graduate school could offer, and in a far better way. A journal published by these unions, covering their monthly transactions, would be immensely valuable.

The clinic reports, properly illustrated, could be made an especially useful feature, and thus would arise an "independent dental journal," whose pages would invite contributions outside of the dental union papers, and altogether the associated unions or societies and their journal would fill a gap wide open at present.

Very little consultation could amalgamate several societies into a district society or union; these could readily combine in a federation under a suitable name, and thus a great step be taken easily, naturally, and inexpensively, ready to grow to international importance.

Then we might have a dental congress, with all the machinery in order to make it a success, whereas now the expense and uncertainty of such an independent effort make it of doubtful expediency.

In this connection the thought arises, Would not a new school of advanced capacity be competent to graduate an M.D.D.S.—Doctor of Medicine and Dental Surgery—and lay the ghost of "dentistry a specialty of medicine" by recognizing in the diploma what medical knowledge is expected of us in general practice, as much and no more than is expected of a specialist in general medicine? An M.D. may be an aurist, gynæcologist, orthopedist, dermatologist, and so on, but quite as uncertain in general practice as the general practitioner is in specialties.

The degree of M.D. does not *qualify* its holder for practicing dentistry, although before the law it protects him. If, in the departure of our schools from the time-honored M.D., which covers a multitude of sins, and by adopting the D.D.S., we shut ourselves off from association except by dispensation, it is time to call a halt, and by proper new arrangements demand recognition as what we are or ought to be, to be at all. Would it be M.D.D.S.?

SECTION II.—Continued.

Oral Surgery and Who should Perform It.

PAPER BY M. G. JENISON, OF MINNEAPOLIS.

IN the rapid development and progress made in dentistry in the past few years we have a record that no other profession can claim; still with it all, much yet remains to be accomplished to place us on a basis where we will be recognized by all as intelligent, competent specialists. Unfortunately, the theory of "the survival of the fittest" does not always apply to D.D.S. and M.D. any more than to many other occupations of life; but with the new laws in regard to practice, and increased requirements being adopted by educational institutions, let us trust that the near future will place us far above the present, particularly in intellectual growth. With the wide field opening before us for study and research, one result is almost certain to follow, and that is, specialists in the dental profession; otherwise our advancement must be retarded, collectively and individually.

In all operations in the mouth or adjoining parts we must not lose sight of the intimate relation existing between that and other parts of the system; of the effects of reflex actions, etc. This much, or more, is required of any competent dentist; but from the practitioner of oral surgery more even must be demanded, for abnormal and pathological conditions in the oral cavity will always be more or less frequent, and form a class of disorders requiring surgical treatment, many of them demanding skill of a higher order than is possessed by the regular practitioner, and by reason of their proximity to vital parts involving much risk to patient and operator; and in the treatment of the parts at the commencement of the alimentary canal, the importance of proper nourishment and perfect cleanliness should be carefully observed in order that systemic complications may not arise.

Thus the oral surgeon should be first a skilled dentist, then especially well posted in anatomy and pathology. In surgery, reflex

action from these parts is more frequent and important than from any other regions toward this. Every dentist should be able to diagnose and recognize pathological conditions and abnormal growths of the mouth, the less important of which he could treat successfully, while he should refer the others to those specialists known to be competent for them. These same suggestions are applicable to most of our medical brethren, for this is a field largely out of their sphere, as many of the painful results of their treatment too plainly illustrate. No oral surgeon or dentist would have adopted the treatment given in these few cases below cited, although no claim of perfection or exemption from errors is made for either.

First, for abscess of an upper molar, producing temporary closure of the jaws, the cheek was laid open from the lower border of the orbit to near the angle of the mouth, and the roots cut out with bone forceps. A very unsightly cicatrix was one result.

Second, for abscess of the antrum a flaxseed poultice was kept on the face for over one month, resulting in a fistula in the cheek, one over the second bicuspid, and two in the upper eyelid, carious bone on the inner wall of the orbit, extensive bulging of the eye, and necrosis of the alveolar ridge, involving the three molars. Proper treatment produced a complete cure in less than four months.

Third, fistula under the chin from abscess of right lower central. First diagnosis, cancer, and the surgeon refused to touch it. The second diagnosis was necrosis, and an operation was performed under ether, but with no good result. After thirteen months of this suffering the patient was cured in ten days by treatment of the tooth.

In fractures involving the maxillæ the general practitioner is usually far less competent than the oral surgeon or skilled dentist. His treatment of the teeth at such a time is nearly always defective; and for the making and adjusting of suitable mechanical appliances he is, as a rule, totally unfitted, of which fact cases innumerable might be cited for illustration. In any mechanical treatment of cleft palate we find this same condition strongly shown again.

The lack of ability to readily recognize pathological conditions of the oral cavity is shown in the treatment of earache, etc., where the trouble is entirely reflex, in not recognizing the causes of fistula coming from abscesses or impacted teeth, etc.

When the professional man reaches the point where he does not claim to know and do everything, we can look for more perfect results; and high up on the way to perfection and honor will be found the dentist who is making oral surgery his life-work.

SECTION II.—Continued.

The Necessity for Independent Dental Journalism.

PAPER BY LOUIS JACK, OF THE SECTION.

I ARISE to address this Association upon the use and importance to dentistry of independent journalism.

It is not my desire to occupy your attention by an enlarged consideration of the subject, but I do so for the purpose of inducing discussion by others of these topics. It needs but little demonstration to establish the principle that the development of correct sentiments upon all questions of polity which are immanent and which may arise relating to dentistry can be best stimulated in a state of freedom of its literature from the bias of personal interests.

The public press is an indispensable department of the most important of all the liberal professions,—that of the teacher,—and it must be conceded that it has for a long period exercised an influence second to none in forming opinion and in shaping the course of events.

It occupies a peculiar and conspicuous position: for while it is prepared to dispense instruction in any direction toward which the human mind may turn; while it may be called upon for an answer to any question which may be formed in the field of human knowledge, and is expected to give an intelligent answer,—it wields the power of creating and of shaping public opinion by the presentation of facts and the statement of principles. It also fulfills the function of seeing for the people by using its Argus eyes to penetrate every action which concerns the public or human advancement. These functions could not be most usefully exercised if the public press were not independent, for so far as it is bound by the influence of party, prejudice, or pecuniary interests, so far must it fail properly to carry out the purpose for which it exists. It is plainly evident that the exponents of truth should be free from self-interest and be of good morals to see clearly any question for others involving the presentation of truth.

When the press is not free in the sense above expressed, the development of public opinion is hampered, and the minds of those under its influence are necessarily darkened. The contrast of the two conditions is shown in the comparison of the press of Russia and England, and it may be stated as axiomatic that any influence which checks full expression of thought is an enslaving one.

What the press performs for the public, dental journalism should do for dentistry, and those controlling the latter should have an eye single to the higher interests of dentistry. It is a fact with which you all are familiar, that dental journalism has for many years, with little exception, been under the management of persons engaged in commercial pursuits, and whatever their pretensions may have been, they have failed editorially to discuss the questions concerning us, as they have arisen, without the bias of their business interests. In the very nature of the sensitiveness of trade and the constitution of the human faculties it could not be otherwise. Independent opinion could not be stated, for the fear of its influence upon their business.

They may very excellently record the transactions of things done, but in the very nature of the case they cannot properly present the living issues of the time. They have not the desirable sympathy, because they are not of us. They have not the power to produce the pabulum out of which professional character is formed. For this reason they do not properly influence the minds of the student and the younger men, and therefore the most liberal views of our relations to each other are in a state of decay, and there is consequent deficiency of *esprit de corps.*

There is a further reason which disqualifies business men from conducting our literature for us. They have proven by their conduct and have declared by their words that the ethics of business and the ethics of professional life are different. This appears to be true as the world now goes. The essential spirit of professional ethics is such a consideration for the interests of others as to lead one to prefer the good of another to his own benefit. This is a heavenly spirit. The general tendency of trade is to secure the good of the individual to the disadvantage or the injury of others. This in comparison with the other course is an evil nature. They who are guided by this principle of action are morally unfit to lead the opinions of others, for the reason that as their actions spring from bad principles they fail to be in the light of truth.

These journals have usurped the function of supplying the dental

profession with liberal and pertinent thoughts upon the current events related to dentistry as they have arisen. They have stifled in some cases the full expression upon questions which were by some construction of theirs not favorable to their interests, and have not hesitated to use those who have sold the birthright of honorable manhood to inculcate sentiments averse to high professional views and have tried thereby to create false ideas. They have used their influence and the power of their agents to check the efforts of dentists to organize for the purpose of defending themselves from the exactions of those who have under their encouragement grown into dangerous opponents to our professional interests. They have not had the disposition or the courage, even conceding they have possessed the clearness of intellect, to do any of those things which go to form the true grain of professional life.

It can scarcely fail to be recognized that dental journalism has for many years been in such condition as not to have called out the best thoughts of our leading men upon subjects concerning the growth of politic questions, and, being bound in these respects, it is a matter of serious concern whether in scientific directions there has been that freedom of growth which otherwise might have taken place.

In respect of the dental press there are many subjects requiring to be dealt with in a manner which may promote the expression of the strongest and fullest sentiments of our members, and of developing enlarged and liberal views which are not likely to be fulfilled in a proper manner by any private journal. We have arrived at a stage when, for our protection as well as our advancement, I believe we should maintain an adequate and free medium of expression, and when, for our self-respect, we should ourselves have charge of our current literature. Whether we are a branch of the medical profession or whether we are a profession unto ourselves, the demand of the time is that we should be the custodians of our own journalism. In what estimation would the medical profession be held if it possessed so indifferent a spirit as to tolerate its journalism to be controlled by the purveyors of its drugs and instruments? Would it in that state be considered a profession? Would it not probably have remained in the condition it was in England a few generations since, when its standing was of the poorest? It would probably be overrun by the proprietors of secret processes, and in this age by a swarm of patents for formulas and instruments.

What would be thought to-day in the medical profession of the specialties of ophthalmology and gynæcology if the literature of these

departments of medicine were managed by those who serve these specialties with their appliances? Let me say again, we should likewise be free if we would be self-respecting, and if we would have the enlarging confidence of the parent schools of medicine and the abiding esteem of the public.

Some of these expressions may appear pointed and seem unnecessarily severe. They are stated out of regard for our professional good, and in view of this the individual is as nothing. While what I here state may not now make much impression, nevertheless we will have need at length to awake to our necessities in respect to the state of our journalism if we would reach the full stature of professional manhood.

DISCUSSION.

Dr. Barrett: A profession without a literature is an anomaly. There can be no such thing. Professional life, professional action, professional intelligence, presuppose a literature. That literature will gauge the level of the profession; it cannot rise above the general intelligence, but it will be its exponent. This must necessarily be the case. Our journalistic literature is far in advance of what it was years ago. The whole profession has risen to a higher plane, and as we have advanced we have lifted the journals—or the journals have lifted us. Certainly we have both risen together. What its literature shall be depends entirely upon the profession, whether it be that of law, medicine, or divinity. It is, in fact, an integral part of the profession, and one might as well speak of the hand or arm or head being in advance of the body as to assert that a literature is ahead of or behind the body of which it forms an essential part. Go back, if you please, to the time in which there was no such thing as a professional feeling among dentists, or any profession of dentistry, and you will learn, if you do not now know it, that there was then no literature. Before the days of the fathers of medicine there was no medical literature, and there was no such thing as a medical profession, for a profession implies something more than a body of men who follow any particular avocation, whether it be a learned calling or not. Was Hippocrates in advance of his profession? No, for before his day there was scarce such a thing as a medical profession. He organized and formulated the possibilities which existed, and through his writings largely the whole was crystallized into a learned profession. The dentistry of the days of Harris and Bond was in a formative state, and those men with their

compeers were but the mouth-pieces, the index of the inchoate profession. The world had advanced far enough to make a profession of dentistry possible. It had begun to recognize the possibilities of this aspirant for professional honors, and the men of that day were but the exponents of what dentistry was becoming. Their writings are a fair criterion of what the dental standing of that day was.

So the literature will exactly mark the status of any body which has a literature. It may be fostered or discouraged, but in the exact proportion in which this is done will the status of the profession be advanced or retarded, for, raising the one we invariably elevate the other. They are indissolubly connected. Put the foot upon the one, and the other must writhe and perish.

The literature of a profession, then, will be simply a reflection of the status of that profession, and must depend wholly upon it for its condition.

Dentistry has not done justice by its literature in the past. Not that the profession as a whole has not appreciated its journals, but its exponents have not always been men of literary judgment, and its leading societies have not always honestly reflected professional sentiment. I think I may without egotism claim to be one of the few who are qualified to speak knowingly upon this subject. As the editor, for a number of years, of one of the most widely-known journals, I have had means of fairly judging the matter. Certainly, when I was more intimately connected with the literature of dentistry I had no reason to find fault with my profession. It has been asserted throughout the length and breadth of the land that the journal of which I was the editor was held up and kept alive by the pecuniary sacrifices of those who were its publishers. This was not so. The *Independent Practitioner* always paid its bills in a liberal spirit, and it was never compelled to ask alms at the hands of any one. From the time when dentists became convinced that it was worth their patronage, it never had any cause for complaint on that score. Just as soon as men became satisfied that it was worth the money asked for it, there was no lack of subscribers or patronage. But journals have been published which, without any real claim upon the attention of dentists, yet demanded patronage, and because they were not sustained they bitterly denounced dentistry as inappreciative of its literature. Books have been published that were a burlesque upon the intelligence of dentists, and because they were not eagerly purchased the profession, forsooth, was neglectful of its literature. As if some of the exhibitions of ignorance which

have been offered and urged upon a suffering profession were fit for literary food!

Every journal that was worthy of the name—and some that were not—has met with a fair show of recognition. The most of them have not made money because they were published for other purposes. But they have had about all the subscribers that they deserved. To be sure, there are many "dead beats" in dentistry, and some have supported their journal by promptly subscribing, and then flying in a passion when the bill was presented. Some of the men who were most solicitous for our journalism finally let the true inwardness of their anxiety crop out, and it proved to be a personal ambition to have their name appear upon the title-page, or to be connected with the management of a journal. But there are many others—more than any of you will know until you are placed in a position to have personal knowledge, for there is more good in the world than is usually found out by the average man—there are many noble men who quietly and without ostentation put their hands in their pockets and planked down their cash as an earnest of their desire to sustain our literature. I will name one such, not in a spirit of adulation or sycophancy, but to show that all is not brass among us, but that there is some gold that is not gilt. When a bill for his subscription was sent to Professor Darby,—a bill of $2.50,—he returned $10.00, and when he was asked what disposition should be made of the surplus he answered that ten dollars was the amount that he wished to pay for that year, and consequently there was no surplus.

But I said that some of our leading societies had not given our journals a fair chance, and I know of none which has been a greater offender in this respect than the American Dental Association. What is its attitude to-day toward the journals? For the sake of saving a few pitiful dollars it gives its treasures wholly and exclusively into the keeping of a dental supply house. It slams the doors in the faces of all its journals, and refuses to allow them access to the avenues of information. If the society has any excuse for existence, it is that it is engaged in the effort to disseminate professional information, and yet it deliberately closes up the legitimate channels through which such information must flow. Professing to keep in view the good of the whole body of dentists, it sells out to a house which is in the business the very knowledge which has been given for the good of the whole. And the only excuse which ever has or ever can be urged is that a few dollars may be made by this course. And is there, then, nothing higher or nobler than the making

of money? Has the representative society of America no soul above a dollar—no principle that is not for sale? Do we come here from the remote corners of our country to make money? If that is the end and aim of the members, let us for shame's sake adjourn and go home, for we can earn more there than here. If we are not here for nobler, higher purposes, let us for our own credit adjourn at once. But I do not believe that this dirty work is the act of our best men. The politicians of the society have managed this matter, and like other politicians they are scarcely the best judges of what is the fit thing to do in a case of morals or of professional ethics.

I have not written a paper for this society for some years, because while the editor of a reputable journal I was debarred from publishing my own articles. I know of at least six of the best writers in the profession who will not write papers for the society, because of its unjust discrimination against the journals. Nor is this any reflection upon the house which does have a monopoly of the brain-work done in this society. That house does the work as well as it could possibly be done, unless we may criticise the brevity of the reports, and I do not believe that it desires the work for any selfish purpose. But the principle of the thing is wholly wrong, and it matters not what firm has the preference. When it was proposed that the *Independent Practitioner* should compete for this exclusive privilege, I demurred at once, and said that we would scorn to accept anything which was not free for every reputable journal.

We have heard in the paper to which we have just listened a plea for independent journalism. I am not on my feet merely to second that plea. I care little whether our journalism is independent or dependent, provided it is good journalism. If it fairly reflects the wishes and aspirations and sentiments of a majority of the dentists, it has an equal right to recognition, no matter by whom it is published. But I do demand that every journal should be given a fair chance, and that this, the representative society of America, should not discriminate against the independent journals as it is now doing. It has no right to tie the hands of our editors, cast them in the deep sea, and then demand that they should keep afloat. Give them a fair chance, start them in the race on equal terms, so far as is possible, and then the devil take the hindmost. If a journal does not pursue a reputable professional course, mark your disapproval by depriving its reporters of a seat in the hall. But as long as they are honestly laboring for the good of dentistry, do not place a premium on quackery by encouraging it among the journals.

These facts have been burning in my heart for years, but my mouth was sealed because I would have been liable to the charge of having a personal axe to grind, had I spoken my mind freely. To be sure, I could not publish my own papers if read before this body, and I could not therefore comment upon them and endeavor to follow up the subject in my own journal, but I could and did decline to write any papers. As long as this society clings to its present position it is unworthy to consider the subject of dental literature, for it is doing its utmost to discourage the journals.

I would have it throw wide the doors of professional intelligence. I would have it strike off the fetters which it has placed upon our literature. I would have it assist in spreading instead of confining the dissemination of professional intelligence.

This society is not alone in this work. I have sent reporters to dental meetings and have had them refused the privilege of making a report, because, forsooth, some dental supply house had bought up the society, and was even then engaged in a lascivious dalliance beneath the very shadow of our professional banner. The society had prostituted itself, had sold its honor, and so far as was possible had debauched professional sentiment by being false to its professional obligations. As the exponent of professional intelligence and the recognized channel for the conveyance of professional information, the journal which I represented had a prescriptive right to dental intelligence which was denied. This was not true professional conduct, and no society has a right to sell for a money or any other consideration that which is the property of the whole.

If we cannot, as a society, rise to the true status of the hour, if we cannot comprehend what is due from professional men to professional men and to the profession itself, then we have no excuse for an existence. If the money consideration has any influence whatever in dominating our course as a society, then we should disband and go home, for we come here to consider something else and to be for the moment rid of the contaminating influence of mere money-grubbing. When we are at home and about our every-day employment, then we are, and should be, in moderation, swayed by selfish influences; but here, when we meet for the consideration of something above and beyond mere personal greed, let us exhibit the spirit of true professional men and not sell all for money.

Dr. Crouse: I did not hear the paper read, but did hear part of the last speech. I know something about publishing the Transactions of the American Dental Association on our own hook. We

have been there. We were bankrupt for years. I remember well starting around in this Association, a number of years ago, with a subscription-paper to raise money sufficient to pay past bills which the Publication Committee had been obliged to contract in order to get out the Transactions, and it did not seem to me it was a very dignified way of doing our business. I presume I had as much to do with the change in the manner of publishing as anyone. I made the first arrangement with Dr. White to take our proceedings as an offset for publishing the Transactions. Since then what has been the state of affairs? Our Transactions have been well published, and I do not think the Association has been made to feel under any terrible obligation, only as I try to make my patients feel under obligation to me for having done a thing right and well and honestly; and this high-flowing speech about the lack of dignity in this body for so doing is all nonsense. Any reporter can come here and make as full reports of these meetings as he sees fit. The Publication Committee, in a business-like way, make the best arrangement they can for the publication of the Transactions, and have something in the treasury when they need it. If there is anything undignified in that I fail to see it.

SECTION III.

OPERATIVE DENTISTRY.

REPORT BY N. S. HOFF, SECRETARY OF THE SECTION.

IN attempting to report the progress of the Section on Operative Dentistry this year, we are somewhat embarrassed by the difficulties we encounter, for we realize that it would be neither interesting nor instructive to recall to the minds of those already familiar with them the long list of papers and their discussions read before the various societies and published in the journals.

The most that it is possible for us to do is in a brief manner to call your attention to some of the prominent features of activity in connection with the subject of Operative Dentistry.

Among the important events of the year, the appearance of Prof. Fillebrown's book on Operative Dentistry, written at the request of the National Association of Dental Faculties, should be mentioned. It is an octavo volume of 270 pages, and treats principally of manipulations concerned in the operations of filling and crown- and bridge-work.

A new edition of that standard work, Harris's Principles and Practice of Dentistry, has also appeared during the year, of which it is not necessary for us to say anything, except that it is superior to the old work, which is familiar to all.

It is a matter of importance and congratulation that we note the disposition on the part of the manufacturers to improve the quality of the appliances and instruments. The most noticeable activity seems to prevail in the matter of the application of electricity to dental uses. Its adaptation to the engine, mallet, mouth-mirror, and various surgical and therapeutic uses about the mouth is likely to be of great value, and will in some respects very much modify former methods of operating.

Nothing of especial interest in operative treatment of diseased

conditions of the oral cavity has appeared during the year. The subject of the treatment of exposed pulps has been one of unusual interest; and it is hoped that the liberal consideration which this subject has received during the year, because of the advocacy of the idea of its almost universal destruction, will result in the return to a more conservative treatment of this invaluable organ.

The practice of immediate root-filling still continues a popular one; but a number of reported cases of adverse results has induced caution, and the necessity for a more careful discrimination in the selection of cases for this operation is clearly indicated. The application of therapeutic agents in the treatment of alveolar abscess is not, neither is it likely to become, an obsolete practice.

Dr. Joseph Head, of Philadelphia, suggests cotton saturated with carbolized cosmoline as a permanent and satisfactory root-filling.

The subject of implantation is still an interesting one, but as it is fully reported under another Section, we will omit any further reference to it here.

Crown- and bridge-work also continues to be a popular subject, and much has been done to perfect it during the year. It has come to be of so much importance that special departments for teaching it have been organized in connection with many of the dental colleges, and it is rapidly being set apart by many as a specialty, occupying an intermediate ground between operative and mechanical dentistry. As quite a number of the prominent members of the Association have expressed their opinion that this work should be reported under the Section on Prosthetic Dentistry, we have asked the chairman of Section I to make this report.

The subject of porcelain inlays has received considerable attention during the year. Dr. A. H. Thompson, in a paper read before the Chicago Dental Society, proposes a gum-colored facing or inlay for restoring the gum in buccal cavities involving the roots of teeth. Dr. A. Robinson, of Grand Rapids, Mich., suggests a gold inlay, made by flowing pure gold into a platinum matrix that has been burnished to fit the cavity. Many other suggestions have been made looking to the perfection of this process, and it is hoped that further developments will make this another of the valuable resources of conservative dentistry.

As we have looked in review over the past year, and noted the inactivity in the consideration of the subject of filling teeth, it seemed that we had either reached a point where we were satisfied to remain,—in the belief that nothing further was desirable or

possible,—or that for the present we were so busy with more important affairs that this one was set aside.

Almost a score of copper amalgams have been offered to the profession during the year, each one claiming universal merit and superiority; but how far they are being adopted and what the harvest will be time alone will tell. In the matter of cements there seems to have been no special advance. During the year a new form of crystal gold (Zur Nedden's crystal gold) has been brought to the notice of the profession in this country, although it has been for many years used in Germany and Switzerland and other parts of Europe. The claims for it are that it packs readily and easily with instruments peculiarly adapted to the purpose, and that it produces a hard and homogeneous filling which is calculated to and does preserve the tooth in a satisfactory manner.

We must admit that we do not yet possess an ideal filling-material. Undoubtedly gold is the best we have, and yet no one will say that it supplies every need or is satisfactory in all cases. But we believe that it is the difficulties attending the introduction of large gold fillings—viz, fatigue to patient and operator, expense, and the high order of skill required for its successful manipulation—that have almost wholly checked the ambition of good operators to reach a high order of attainment as gold-fillers. The plastic craze that has possessed the profession for the past six or seven years has brought with it nothing that is calculated to call out the highest order of manipulative ability. If this be true, may we not see here the reason for the apparent lack of interest in operative dentistry—or more especially in filling—at the present time?

But have we no reason to believe that this apparent lack of interest is not real and that there is nothing of hope in the future? As we have suggested above, there has been considerable activity in the matter of copper amalgams, porcelain and gold inlays, and the betterment of appliances and facilities; there has also appeared a decided interest in the endeavor to secure remedies and methods of procedure for obtunding sensitive dentine, thus rendering large and tedious operations upon the teeth less painful and fatiguing. Undoubtedly the present popular practice of inserting crowns where the teeth would require large fillings in a large measure results from the failure of plastic fillings to preserve these teeth in a satisfactory manner and the difficulties attending the insertion of gold. May we not hope that with improved facilities and additional accessories in the way of pain-obtundents there shall soon be a

return to the more general use of the most reliable filling-material we have ever had and to a revived interest in this part of our work?

We have to report a paper giving the results of some experiments performed by Dr. Joseph Head, of Philadelphia, in filling roots of teeth with carbolized cosmoline and cotton.

Also a paper by Dr. V. H. Jackson, of New York, on appliances for correcting irregularities.

Also a case in practice by Dr. G. B. Watkins, of Detroit.

Also a paper by Dr. Wilhelm Herbst, on a method of filling teeth with glass, presented by Dr. G. L. Curtis.

SECTION III.—Continued.

Some Methods of Regulating Teeth.

PAPER BY V. H. JACKSON, OF THE SECTION.

IT is not my purpose to present an exhaustive paper, or make claims of superiority for methods or appliances, but I wish to describe a few additional practical methods in the construction of regulating appliances which have been used in practice a sufficient length of time to prove their value.

In studying models of the jaws where the teeth are much crowded, to determine whether the arch should be expanded or extraction resorted to, and in some cases before deciding on any method of moving the teeth, it is well to prepare an extra model from an impression, and after carving the teeth cut those to be moved from the model with a knife or a small disk saw attached to the dental engine, and again attach them to the model in the position it is desired that they shall assume when regulated. The dividers may be used to advantage in spacing the arch.

In the practice of the writer the spring is used in fixed as well as in removable appliances, the latter being preferred when practicable. Where one or more springs are to be used, their shape and position on the model can be best determined by bending soft copper wires and attaching them in position with wax, especially if several are to be used, as their action and relationship can thus be seen at a glance.

The writer has for some time used very satisfactorily a method of uniting two or more pieces of piano-wire to form appliances to be used independently for regulating, and for uniting piano-wire to gold, copper, silver, and other metals.

In uniting piano-wire it can be left round, or flattened by the use of the hammer, file, or corundum-stone, and the parts to be

united made bright with emery-cloth, and held together temporarily by cord at one or more places. The parts joining are then bound tightly from end to end with a fine binding-wire of copper, iron, or platinum (see Fig. 1). The part bound is then soldered with soft solder by warming it with a spirit-lamp, and laying on pieces of solder, the surface having been covered with muriate of zinc. It is found, however, that tin is preferable, as it remains bright in the mouth, and can be used in the place of solder, except where gold or silver are used. Or the appliance may be immersed in the molten metal, tinning the whole apparatus at the same time. The temper of the steel is not materially changed by the process of tinning. Iron binding-wire has been used in the mouth for months, but is very liable to corrode, even though well tinned. The smaller-sized copper wire has been used more satisfactorily, as it is more easily worked, and does not corrode. Tin or solder unites with it freely. A very nice finish to the joint can be made by rolling a small-sized copper wire very thin and using it in the same manner.

FIG. 1.

We will now consider a method of bringing the cuspid teeth in line where they are too prominent or entirely outside of the normal line of the arch, the lateral incisor on one or both sides being nearly in contact with the first bicuspid, whether the cuspid be fully erupted or just pointing through the gum (Fig. 2). In the latter case it will be admitted that it is the proper time to move the cuspid into line, if an appliance can be so constructed and adapted as to move it to place without causing more inflammation, and more inconvenience to the patient than it would if more fully erupted. In either case, however, it can be easily accomplished by the following briefly-described device.

Across the model of the arch to be corrected place a piece of piano-wire, about No. 20 gauge, between the lateral and first bicuspid, on either side if both cuspids are to be moved, and bend to follow the curve of the roof of the mouth between those points. If there is insufficient room for the wire to pass between the teeth, they should be separated by wedging until one wire can pass freely. The ends of the wire are then curved forward and bent back on it, forming a loop on either end of sufficient size and depth to surround the cuspid and pass again between the lateral and bicuspid, with the ends cut off about one-eighth of an inch from the lateral. The looped end of the wire when spread forms a spring which will sepa-

rate the lateral from the bicuspid, making a space for the cuspid. The end of the loop is now bent upward, which makes an additional spring that bears on the cuspid and forces it into line as space is being made for it (Fig. 3).

FIG. 2.

If it is found, in studying the model, that any portion of the arch back of the cuspid should be spread, to assist in correcting the irregularity or to improve the articulation of the teeth, another wire is adjusted to accompany the former one across the arch to the palatal surface of the bicuspids, and bent backward following the

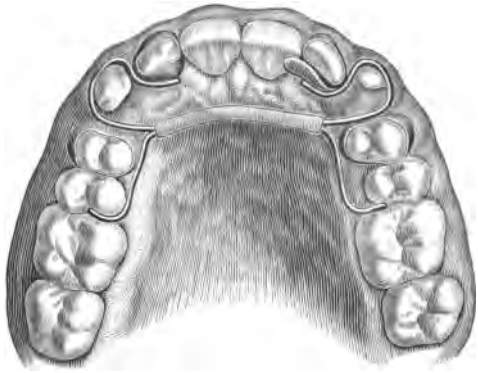
FIG. 3.

line of the gum beyond the teeth to be moved and the end curved up onto the grinding-surface at any place that will not interfere with the articulation, to keep the wire from pressing on the gum when in use. It will readily be seen that this portion of the appli-

ance forms a spring, and when spread will force the teeth outward, enlarging the arch as desired (Fig. 4).

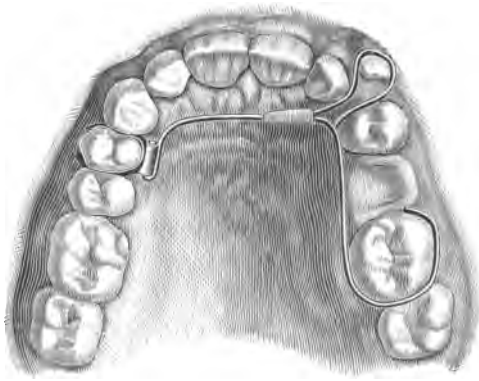
If it is found more practical to remove either of the bicuspids to give space for the cuspid (see Fig. 3), the portion of the appliance

FIG. 4.



last described may extend beyond one or more molars and terminate in a clasp around a tooth that will assist in drawing the bicuspid backward. The two wires mentioned are then bound together with the binding-wire and tinned as described (Fig. 5). The appliance is best

FIG. 5.



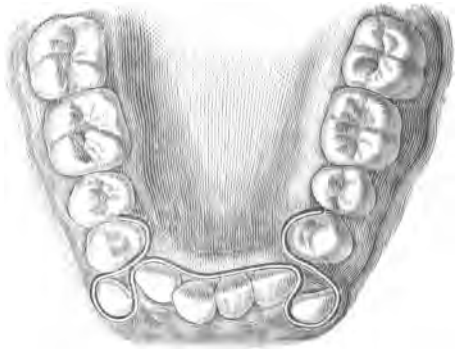
retained by placing a gold band with a groove on its surface on one or more teeth on either side of the arch. The lateral incisors are usually chosen, for reasons described later. It will be found, however, that retaining-bands will not be required in all cases.

After the smooth bands are fitted to the teeth, the appliance is placed in position, and the bands marked below its line of contact. The bands are then removed, and the smaller size platinum wire is fitted to the marked portion and soldered to form the groove. The band is then fastened to the tooth with oxyphosphate cement. If the appliance is not well retained, bands may be placed on the bicuspids or other teeth as needed.

If the lateral incisors are to be moved a considerable distance or require turning forward, a lug may be soldered to the palatal surface of the band, and project back of the central incisor (see Figs. 3 and 4).

If all the incisors are to be carried forward, a thin bar may unite the lateral incisors back of the centrals and thus hold all the incisors in the same relationship.

Fig. 6.



Similar appliances to those above described may be used for making room and forcing prominent lower cuspids into line. In such a case the wire should follow the curve of the arch back of the lower incisors, passing between the laterals and first bicuspids, forming a loop by curving backward (Fig. 6), and preferably be retained by bands.

If posterior teeth are to be moved, additions may be made to the appliance as previously described.

It is found in practice that wires interfere less with the voice articulation when they cross the roof of the mouth by the first bicuspids, following the curve of the arch, than when they are arranged to pass near the palatal surfaces of the incisors.

Innumerable changes can be made in the arrangements of the springs for the purposes mentioned. A few of the important ones only will be stated here.

If the arch is not to be spread laterally, or the position of the

bicuspids changed, the first wire crossing the arch can be used alone in many cases by employing bands on the lateral incisors and the first bicuspids; or two wires may cross the arch, with the ends of one curved so as to encircle the cuspid, and the wires separated to act as a spring to gain the space required.

If but one cuspid is out of the arch, a gold band is placed on the opposite one, or on a bicuspid, with either an eye or a tube soldered on the palatal side, into which the wire, bent at right angles, can hook, and thus be held firm, and the other end is formed and held as before (see Fig. 5). The appliance can be removed when more pressure is needed, and changed at any point with the clasp-benders.

The richer spring metals will not be found to be so effective, but if used with the above method a flat piece of gold, or gold and iridium, should cross the roof of the mouth in place of the wires described, with the spring wire soldered to it to form the springs mentioned.

SECTION III.—Continued.

A Practical Case of Regulating.

PRESENTED BY GEO. B. WATKINS, OF THE SECTION.

I HAVE here two casts of the mouth of a young lady twenty-three years of age. She came to me three years ago with the right superior temporary cuspid badly decayed. I extracted it and found the point of the permanent tooth just showing. After waiting six months, as the tooth had not come down at all, I made her a plate with tooth attached which she wore for two years and a half. The permanent tooth still remained unchanged in position, so I then proposed to her to put on an appliance to bring the tooth down to its proper position. She consented. In order to attach my appliance I cut the gum away from the palatal surface of the imbedded tooth, tapped it, and inserted an anchor screw with an eyelet in the end of it. I then applied a Patrick regulator, attached to the sixth-year molar on the right side and the second bicuspid on the left, and placed T-bars on the bow and between the incisor teeth to prevent the regulator from being crowded up against the gums. I next made a gold bar with a slide to fit the regulating bow on one end of it and an eyelet-hole in the other end; this I placed on the bow just opposite where the tooth should be. The bar is long enough, so that it protrudes just below where the end of the tooth should be when in place. Now the appliance is complete, with the exception of tying the eyelet in the bar to that in the screw in the tooth; this should be tied quite tight with waxed floss silk and the silk replaced every second day. In this way I brought the tooth down to its proper position in just sixty days, and retained it there forty days longer to allow it to become solid in its new position before removing my regulator; and now, three months after, the tooth is in perfect position.

[The casts of the mouth before and after and the regulating appliance were presented for inspection.]

SECTION III.—Continued.

Glass as Filling-Material.

By WILHELM HERBST, Bremen, Germany.

(Read by Dr. G. L. Curtis, of Syracuse.)

IT is evident that on the outer surface of the front teeth no kind of filling looks beautiful; amalgam, tin, and tin and gold become dark; cement wears away with use and always looks muddy, and even gold fillings, whenever they become visible, disturb our sense of beauty.

For this reason attempts have long been in progress to fill such conspicuous cavities with pieces of the substance from which artificial teeth are made, but as this method is both very troublesome and quite unreliable, I have for the last few years been employing for such cavities a mixture of various kinds of glass, and by repeated experiment have obtained excellent results.

Those students and those of my colleagues who participated in the course of operations in Leipsic, as well as those gentlemen who had the opportunity of attending the twenty-fifth anniversary of the founding of the Frankfort Association, at Frankfort-on-the-Main, will understand my method, and as it is easily performed and answers the purpose, they have doubtless already begun to put it in practice. At previous conventions I had demonstrated the preparation of these glass fillings, but the process employed was then very complicated. Now, however, having dispensed with all such expedients as muffles, etc., the process of their manufacture is made very simple, and of great value to every practitioner. In the following article I shall attempt to describe the preparation of these glass fillings.

Two kinds of glass are necessary for this work: viz, milk glass, from a broken lamp-globe or the like, yet not from milk-glass cylinders (for gas), since these blacken in burning; and brown glass, the

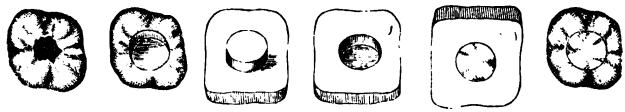
best of which is obtained from a cocaine or chloroform flask. A Bunsen burner, a blow-pipe, and some soldering coal, as well as a fine brush, a clean linen cloth, and a few grains of sand, are also necessary.

Each kind of glass is separately pulverized in a porcelain or agate mortar, and then thoroughly washed with clean water by pouring the water on and off until it ceases to become milky. Then, after being allowed to dry, the two kinds of powder are put up in glasses separately. The mortar must not be of metal, nor should an agate or porcelain mortar in which amalgam or metal has been worked be used, unless both mortar and pestle be first cleaned with nitric acid.

The form of the cavity (Fig. 1) is made regular by boring with a round drill so that no undercut remains (Fig. 2). The edges should not be rounded off, as it is important that they be left finally as nearly invisible as possible.

Take now two or three impressions of the cavity (Fig. 3), using for the purpose a piece of wax or a piece of Stent's mass whose outer surface has been slightly warmed. In order to give the tooth-piece as natural a color as possible, it may be given a gold base, in

FIG. 1. FIG. 2. FIG. 3. FIG. 4. FIG. 5. FIG. 6.



which case rather hard wax, on which a leaf of gold foil has been laid, should be used for the impressions. After the hardening of the gypsum, the wax is carefully separated with boiling water. As a guide to the color of the filling, select an artificial tooth of exactly the color of the tooth to be filled.

Now sprinkle the impressions with a mixture of three parts gypsum and one part pulverized pumice, carefully avoiding blowing upon it the while, also taking pains that the pieces of gypsum be not too large. After being allowed to harden, the impression masses are separated. Mix eight parts of the milk glass with one part of the brown in a clean vessel, and wet the mixture with water. The models (Fig. 4) are placed in another vessel of clean water, and after the gypsum has become thoroughly saturated with the water, the cavities in them are filled by means of a brush three-fourths full of the glass mixture. A clean linen cloth is then held against the gypsum, until both the gypsum and the mixture are as free from water as may be.

The models are next laid upon an iron plate and heated hot, then placed on a piece of soldering coal, and with the blow-pipe the flame of a Bunsen burner is thrown upon them until the glass mixture melts, especial care being taken that the flame of the burner, which must be a single-flame Bunsen burner, does not become white, but burns blue, as otherwise the glass will become dark. The glass melts easily, provided the models are first well heated. After cooling, the test tooth is held against the glass piece (Fig. 5) to compare the colors of the two. Inasmuch as it is usually necessary to melt the glass two or three times, it is very easy, by adding more of the brown or of the milk glass, to obtain a satisfactory shade. Before a second or third attempt, lay the models and the molten glass again in water and proceed as above described. Be careful that the filling be not too large; rather let it be somewhat too small.

Select, now, the best of the three prepared fillings and put it into the cavity. It will be found to join the edges of the latter exactly. After drilling the cavity somewhat deeper and making the necessary undercuts, fasten the glass piece in with cement, being careful not to lay it on too thick. During the hardening of the cement the piece must, of course, not be moved (Fig. 6). It is very essential that the surface of the piece, where it comes in contact with the cement, be roughened. For this purpose a few grains of sand may be sprinkled on the bottom of the gypsum cavity before putting in the mixture. The glass will unite with the sand in burning, making the surface sufficiently rough.

DISCUSSION.

Dr. Barrett: In the filling of root-canals the anatomical structure of the roots should be taken into consideration. We are accustomed to consider the pulp-canal as a direct channel through the tooth in all cases, and have been taught that the pulp is supplied through this canal from a branch artery. It is claimed by many that with certain instruments we may proceed directly through the canal, and immediately out at the foramen. I believe this to be impossible in a majority of cases. You will frequently find upon examination that the canal divides and there are several foraminal openings. In a number of cases I have found as many as a dozen. This subject was more particularly brought to my mind from conversations with a gentleman who coincided with me in the opinion

that the blood-supply of a tooth is not derived from an artery outside, but that the placenta which supplies the pulp is the pericementum; and we find in filling roots of teeth of a rather loose histological structure with liquid gutta-percha, that when pressure is placed upon it it will exude in little shreds at many points along the root. I am not here prepared to demonstrate this, but it is a point of great interest and importance and should be thoroughly investigated. Sometimes in passing a broach up the canal of a devitalized tooth you will find that when it reaches a certain point there is extreme sensitiveness, while after you pass that point you no longer have the irritation. You will find this especially the case after removing the pulp entirely under the effect of cocaine, which I have done in many instances. We almost always find a tender point near the extremity of the root. This may in part be due to the vitality of the cementum, as the pulp having been devitalized the dentine no longer has sensation; but not infrequently I believe that this sensitive point marks the entrance to another foramen, or indicates the bifurcation of the dental pulp within the root, and the point of entrance of a vascular and perhaps neural branch.

Dr. Hunt: There is no question whatever about the number of foramina varying considerably in different teeth. In cats' teeth it is quite common to find four, five, or six well-defined foramina of equal size passing out at or in the region of the apex of the root. I have two or three specimens of this kind, and I had hoped to present a paper on the course of the vascular supply of the teeth at this meeting, but it was not possible to complete the preparation of the injected specimens showing clearly what this course is.

The human teeth also have more than one foramen to each root. This has often been demonstrated in clinical teaching of the method of filling root-canals with chlora-percha, the solution passing out through two or three openings at the sides as well as at the apex of the root.

I think I shall be able, with the specimens already prepared, to demonstrate the fact that the vessels of the pulp do not go directly from the main trunk into the apical foramen, but pass into the peridental membrane at a point nearer the cervix of the tooth, and thence have a downward tendency along the sides of the tooth, or nearly so, and then enter the pulp-tissue at the apical foramen or other foramen located above the apex. Also, that the nerve-fibers do not enter the pulp until about the time of the completion of the calcification or formation of the cementum. So far in the investi-

gation of this subject it has not been possible to demonstrate the existence of nerve-fibers or filaments within the basis-substance of the dentine organ before nor up to the time when the apical foramen has taken on the adult form, or the size we usually find it in the completed tooth. This is not so remarkable when we consider the way in which the tooth is developed. At any time after the follicular wall is established about the enamel-organ and the dentine papillæ we find the upper portion of this wall, or that portion in the region of the cutting or grinding-surface of the developing tooth, the most richly supplied with nutrient vessels. This relation does not change up to the time of the eruption of the crown and even to the completion of the root. This supply comes to the tooth from the sides rather than from what will be the apex of the root, or from the region immediately under it; and unless there takes place at this time a radical change from the order of the development, where the course of all the nutrient vessels is from above, this continues to be the order and the course of vessels whose only office is at this time, and afterward, to sustain the finished tooth. If the course of these vessels is from below, or the branches given off from the main trunk pass directly to the apex of the root, then the law under which the tooth is built and the law under which it is sustained are not the same. By following up the question under the first law, it is easy to account for there being more than one foramen in the roots of human teeth. But under the law we have always accepted as being the correct one it is not so easy. By the former process any of the vessels may be built around with the cementum and dentine at a time before the apical portion is formed.

Still further, I have not been able to follow a nerve-fiber directly to the apex of the tooth from the main trunk.

Dr. Abbott: You may have lost it.

Dr. Hunt: Possibly. But I have been able to trace these filaments into the bone surrounding the apex and to a point above it, as well as into other portions of the bone not directly under the apical foramen of the tooth. If this can be done, I think if the nerve-tissue was there passing into the apical foramen it would be of sufficient substance to handle. I have examined carefully sections of pigs' jaws at the ages of two, three, four, and five months after birth.

Dr. Harlan: I would like to inquire if any gentleman present can inform this Association how Dr. Head prepares the root of a tooth for filling with gutta-percha,—if he follows the same method

he pursues in preparing it for filling with carbolized cosmoline and cotton and with oxychloride of zinc? I could not discover from the reading of the paper that his method of preparation or treatment was detailed, so we are in the dark. If we knew his methods, we might come to some conclusion regarding the permeation of the dentine by cosmoline.

DR. OTTOFY: As I understand the paper is to be expunged from the record, I cannot see that its discussion would be a proper thing.

DR. MARSHALL: Would not its exclusion necessarily preclude the discussion?

DR. CUSHING: I do not see why. We need not discuss the paper, but certainly may discuss the points referred to whether they are in or out of the paper.

DR. TRUMAN: You see the difficulty you have gotten into. I opposed the exclusion of this paper; there were many points in it the discussion of which might be of great value. Now we cannot discuss it because it has been thrown out. I would have liked to say something about it.

DR. HOFF: I would like to know if mention was not made of this subject in the report of the Section, and if that does not authorize us to discuss the question.

THE PRESIDENT: The Chair will decide that the subject can be discussed from the reference made to it in the report of the Section.

DR. TRUMAN: How will that sound when the Proceedings are published,—that we had a discussion on a paper that was ruled out?

DR. PATTERSON: It seems a strange idea to me that we should be excluded from discussing subjects well known because reference was made to them in a rejected paper. We can take up any subject generally known to the profession and discuss any point in connection with it. Why can we not do so?

THE PRESIDENT: The Chair has decided that this may be done.

DR. J. R. C. WARD: I was present at the Pennsylvania State Dental Society when Dr. Head read this paper, and in the discussion he stated that he exercised equal care in filling roots, whichever of the three preparations mentioned in the paper he used; but, as he was more familiar with the use of carbolate of cosmoline than with the others, using it almost exclusively, he was therefore, perhaps, more able to do better work with that material and might have better success with it. There was one gentleman present at that meeting who said he had tried the cosmoline in filling roots and had regretted it ever since, as it permeated the whole crown

and discolored it, so that in one case he was obliged to cut off the natural crown and insert an artificial one, on account of its discoloration.

Dr. Head claimed that the cosmoline permeated the root and prevented the absorption of the aniline deposit, and the other gentleman stated that he found it to go even farther than that,—not only through the roots, but through the crown,—and he dreaded the consequences that might follow in the other cases where he had used it.

Dr. Hoff: I will state that the experiments of Dr. Head were performed on three single-rooted teeth, and he enlarged the canals to the foramen before he filled them.

Dr. Harlan: It is my belief that when gutta-percha is used as a root-filling it should be so in a manner substantially as I shall now detail. There may be other and better methods, but this is one I have practiced for a number of years with a great degree of satisfaction and success: After the root is ready to receive the filling,—that presupposes that it is as dry as it can be made,—it is my practice to introduce into the canal eucalyptol, which is diffusible and in which gutta-percha is slightly soluble. After this has been allowed to remain a moment, the excess is wiped out with finely-pointed paper cones, and then the solution of gutta-percha is pumped into the root or roots. This will permit the forcible spreading and diffusion of the dissolved gutta-percha into all the apertures that lead from the pulp-chamber and canals when gutta-percha cones are introduced therein. The cones are never heated before being introduced, but a finely-pointed instrument is heated and passed into the large end of each cone, which is forced into the liquefied gutta-percha, and that is thus forced into all the interstices of the root. These cones are packed until the root is filled. I feel sure that if the gutta-percha were heated and passed into the root it would leak under the circumstances stated by Dr. Head. In reference to the filling of roots with oxychloride of zinc, I have nothing to say.

Dr. S. A. White: You speak of forcing the gutta-percha through the foramen?

Dr. Harlan: No, sir.

Dr. White: How do you prevent it from getting there?

Dr. Harlan: If the foramen is so large that it will go there, I do not mean to prevent it. There might be circumstances under which it would be the least harmful agent that could be introduced, even if it did go there, because it is insoluble in any of the fluids

of the body or in water and is not permeable by them, and it is absolutely innocuous and non-irritating.

DR. MCKELLOPS: You all know how long I have urged the use of gutta-percha for root-filling. I think I was one of the first to adopt it when it was introduced, and I have been its strong advocate ever since. In the paper read this morning the gentleman stated he drilled out the roots. I have seen some of the most beautiful teeth ruined by the enlargement of the root-canal. Can he or anyone else tell me what course a canal is going to take, or what the shape of any root may be, in a person's mouth? Not a bit of it. I have specimens that have been sent to me from all over the country, of roots of different shapes, and I would like to see a drill that could follow their canals. I have heard men claiming to be mechanics say they could do this thing, but I have yet to look at the man who can do it.

Gutta-percha, when it is introduced properly, allowing the chloroform to evaporate a little after each application, can be packed anywhere. You all know how difficult it is to get into the buccal root-canals of molars, but gentlemen claim that they can get there and remove their contents. I will go anywhere to see a man do it, and pay him any price to let me stand by the side of his chair while he performs the operation, and will buy whatever instruments he has, if he will demonstrate to me the practicability of the operation. I can come nearer filling those roots with gutta-percha than with anything else.

DR. WHITE: In filling the roots I have frequently had trouble when gutta-percha alone has been used. Whether or not I have pumped air in with the gutta-percha I do not know, but I do know there has been after-trouble. I have in the last few years used long staple cotton, being very careful to get the silky, strong kind, and, taking a few shreds of this upon a perfectly smooth broach, have, after dipping it into the chlora-percha, passed it without difficulty well up, I think, to the apex.

DR. MCKELLOPS: What teeth did you do that with?

DR. WHITE: In the molars and bicuspids.

DR. MCKELLOPS: In what roots?

DR. WHITE: In the palatal root.

DR. MCKELLOPS: Anyone can do that.

DR. WHITE: I am only saying that when I pursue that method I do not have subsequent trouble. Dr. McKellops spoke about the danger of drilling the root out. I think great mistakes are often

made on that line. A few days before I left home a lady came to me suffering very much from a tooth, the root of which had been drilled through. The party making the opening had lost the direction of the canal, and had passed the drill through the root well up upon its side. So much inflammation, with swelling of the surrounding soft parts, resulted that I could do comparatively little to relieve her. I think as great mistakes are made in trying to clean the roots of teeth by enlarging the canals as are made by leaving them imperfectly cleansed.

My favorite method of filling canals in single-rooted teeth is one that was shown me many years ago by Dr. F. Y. Clark, now of this city, and that is by filling the apical end of the canal with a fine point of hickory. I have successfully practiced that to this day. I have no difficulty in using this method when I might have in trying others.

Dr. Crouse: I wish to ask the gentleman whether he knows that he has violated patents of the International Tooth Crown Company by pursuing that practice?

Dr. Barrett: For two or three years I followed the practice of introducing chlora-percha upon fibrous cotton, but have seen abundant cause for abandoning it. The canals certainly cannot be as perfectly filled by this method as by the use of the gutta-percha cones, after the pumping in of the chlora-percha, in the manner described by Dr. Harlan. I consider that the most perfect of all methods of filling root-canals. Much of the discussion in reference to the drilling out of roots evidently was based on the presupposition that there is but a single foramen to each root, which is not true in all cases, for we frequently find a number of openings, and an attempt to fill such a root in that way would at least be a great mistake. I have been asked a number of times what I believed regarding the apical space. I do not believe there is any such thing in a physiological condition. If there ever is such a space beyond the root of the tooth, it is due to pathological disturbances.

Dr. White: There is no difficulty in reaching the apex of any of the six anterior teeth with hickory. I do not think it is at all necessary to fill the minute canals which Dr. McKellops has referred to.

Dr. J. R. C. Ward: It is practice that makes perfect. In other words, Dr. Harlan, by continually using chlora-percha, makes it a success. Perhaps my friend who uses hickory, using it exclusively, can make that method a success. Others claim success by the exclusive use of cotton, though I think that those who have to handle these cases afterward do not find them so much of a success. I

use oxychloride of zinc almost exclusively, and I think I make a success with that, so I regard that as the best practice. If gutta-percha goes through the root, we do have trouble. I have seen teeth that had to be extracted on that account. If the oxychloride of zinc goes through, it will perhaps create a little trouble for a day or two, and then it will cease, either by absorption or by the adjoining tissues becoming accustomed to it. But the main point that I wished to impress upon you is that the continuous practice of any one method makes it a success in the hands of the skillful operator.

Dr. W. H. Morgan: I enlarge the canals without any exception where I can. You cannot always tell the exact length of the root so as to be able to open it up to the apical foramen. I open them up for two purposes: one is that I may better know what I am doing, and the other in order to remove a portion of the dentine. The tubuli of the teeth are filled with semi-fluid material which if permitted to remain will certainly take on putrefaction under ordinary circumstances. If you have any doubt about it, cut into the crown of a tooth in a young person, that has only recently lost its vitality, and carry a portion of the dentine to your nose, and you will find what I say is true: putrefactive decomposition has been going on. I want to remove a portion of that affected dentine, and hence I enlarge the canals where I can. Where I cannot do that, I cleanse them as well as possible by the ordinary methods. Where the roots are straight, I prefer still to fill them with gold, as a general thing. I have been filling with gutta-percha and oxychloride of zinc to a considerable extent for a number of years, but I am not sure that these latter operations are going to succeed as well as those I made many years ago with gold. I shall have to wait forty years to test the matter, and I do not expect to see the demonstration. I rarely have any trouble after filling root-canals, but I make it a rule to give them thorough antiseptic treatment before they are filled, sometimes treating for weeks before I am fully satisfied. The filling of root-canals with wood might answer for a time,—I do not know how long,—but I should like to see any man put hickory wood into the buccal roots of a molar under ordinary circumstances. It could be done in some young subjects and some of scrofulous tendencies, because the canals in these cases are large, but no one can fill the buccal roots of molars in one case out of five of the teeth of the average man, even though the teeth were out of the mouth and fastened in a vise.

I do not know but that oxychloride of zinc is the best material

that roots can be filled with. I am inclined to that opinion, for the reason that it will absorb a large amount of gas. There would be less irritation of the peridental membrane if the material with which the canals are filled absorbed the gases produced by putrefactive decomposition, and you will occasionally have these gases in spite of everything you can do. I insist upon the enlargement of the canals. If they cannot be enlarged all the way to the apex, they can part way, and then you can better force in your soft material. The entrance into the canals from the pulp-chamber is often less in diameter than the canal beyond, and in such cases it is very difficult to remove the contents or to force in filling-material to effectually close the apical foramen, unless you enlarge the opening. No root was ever perfectly filled with chlora-percha. Do you hear that? Why? Because it is in a fluid state, and the chloroform necessarily lost by evaporation causes the gutta-percha to shrink, leaving the canal but partially filled; but it is a valuable aid in the introduction of the different forms of solid gutta-percha. When I use gutta-percha, as a rule I prepare my roots as well as I can, and with an instrument that acts like a piston—the gutta-percha being softened by heat—I drive it into the roots. It will give pain in some cases for a little while, but it does not cause any permanent trouble, so far as I have been able to judge.

Dr. McKellops: How do you introduce chlora-percha into the canal?

Dr. Morgan: I have not been in the habit of using it.

Dr. McKellops: How do you know its effect?

Dr. Morgan: Because I know from general principles that everything that loses a portion of its substance shrinks. One of two things must take place: either the mass must lessen in size, or it must remain porous, and if it does the latter it is not a perfect filling. Something has been said about Hill's stopping. It is not made at the present time. Dr. Hill told me it was made of gutta-percha and quicklime,—nothing else,—but it was a good article for the purpose for which he used it in his time.

Dr. White: Have you ever filled a root with hickory?

Dr. Morgan: I have tried, but never succeeded. I never saw one that had been in many years unless there was some deterioration of the wood.

Dr. White: I protest against gentlemen condemning methods or materials with which they are not familiar. I claim to be familiar with the method of filling straight roots with hickory, and have

practiced it for eighteen or nineteen years. There seems to be some misapprehension on the part of many present as to the method I have presented. They seem to think that I fill the entire root with wood. Of course that is a mistake. The method is exceedingly simple, and I believe will give as good, if not better, results than any other that can be employed.

A well-seasoned, dense piece of hickory only should be used. File this round and tapering almost to a point; pass it well up into the root, being as nearly certain as one possibly can be that you have reached the apex, without passing beyond. It is in this particular that I value wood above every other material with which to close the foramen. There is a certainty as well as ease of manipulation that I can get with nothing else.

Should there be the slightest indication of pain, withdraw the wood and cut a short piece from the end. Insert again and mark it at cutting-edge of tooth; again remove, and with a sharp knife make a line around it about an eighth of an inch from the point; bend the end over, but do not break it off. Now insert for the last time; the mark will indicate its proper position, and with a tap send it home; a slight twist will break the point off, and the foramen is closed.

Another and most important advantage in its use is that no air is ever forced up beyond the apex to give after-trouble. I also use wood very often in the treatment of these teeth to temporarily close the foramen, leaving just sufficient protruding from the cavity by which it can be withdrawn by means of delicately-pointed forceps, of course in every case sealing the cavity with gutta-percha.

Dr. Morgan: Anybody can understand how to fill part of a root with hickory.

Dr. White: My only object is to know that the foramen is absolutely closed, and then I fill the remainder of the canal with some other material, feeling satisfied that the latter cannot be forced beyond where I wish it to go.

Dr. Truman: It seems to me that there is much in the discussion of filling root-canals that is based largely upon guess-work. I have had some correspondence recently with the gentleman who wrote that paper,—Dr. Head,—in the course of which he sent me quite a number of teeth, the roots of which were filled with different materials,—gutta-percha, oxychloride of zinc, and cosmoline. These teeth I cut into sections and carefully examined under the microscope. All of them had been in aniline dye for several weeks, and without exception they were non-leakable; in other words, all were

perfectly filled as far as the microscope would show. Hence I conclude that the materials used in filling, with the exceptions of raw cotton and of wood,—for I do not believe wood is the proper thing to fill roots with,—will answer the purpose; but the question that has given me a great deal of thought for the past two or three years, and which was alluded to by Dr. Morgan, is that no filling in a canal is or can be perfect. Why? Because a large part of the tooth is made up of tubulated structure, the tubuli holding organic matter, and when the pulp dies the organic matter dies, and decomposition begins to take place immediately, and the sulphuretted hydrogen occasioned by that decomposition is the source of trouble. What, then, should be done? If you simply fill up the central canal and do nothing with the tubuli but bury up the whole of that dead matter in the tooth, what will be the result? In the course of time there will be discoloration of the tooth by reason of that decomposition of the animal tissue. If you put nothing in the tooth to prevent this, but simply fill the central canal, there must necessarily be a partial failure.

My study of the subject and the result of much experimentation led me to the conclusion that it was essential to prevent this decomposition, and that this could best be accomplished by coagulating the organic tissue. The coagulant best adapted for this purpose is chloride of zinc, because of its great affinity for water. It will follow moisture to the very extremities of the tubulated structure, and consequently change the character of its contents so that decomposition will not take place. I have kept albumen under chloride of zinc for months out of the mouth without destructive change occurring, and therefore I have reason to infer that it will prevent its taking place in the tooth.

I have gone to considerable trouble in endeavoring to demonstrate that chloride of zinc passes into the tooth, and had intended to read a paper before this Association on that subject; but the examinations were not complete, so that I cannot say that I have absolutely proved it, but can only reason theoretically that it must pass into it.

In the use of this agent great care should be exercised, for if it is carried through the foramen it causes irritation; hence, whenever I can, I first fill the upper third of the canal and then saturate cotton with chloride of zinc, which I place in the cavity and allow to remain for two or three days, when it should have permeated the tooth and coagulated the organic matter in the tubuli, and then I am quite confident that I can fill it very satisfactorily. I believe that

oxychloride of zinc is the best material to fill the remainder of the canal with, because it will continue the effect that I desire to secure.

DR. MCKELLOPS: With reference to what my friend from the South said about drilling into roots, I would remark that we all know it is very easy to open the entrance to root-canals. Probably no man undertakes to fill a root-canal without first enlarging its entrance enough to enable him to get into it easily; but my point is that we cannot drill to the apex of the root with any certainty of following the canal.

With reference to gutta-percha, I wish to say that the gentleman can never have filled a root with chlora-percha if he says it shrinks. I say emphatically that it does not shrink. There is an evaporation of the chloroform; but if the chlora-percha is introduced properly, by the time you get the root filled all the shrinking will have taken place.

One word in relation to filling canals with gold. Some thirty-two years ago John S. Clarke came from New Orleans and introduced the method of filling teeth with gold foil made into cylinders, a method he had learned from a gentleman in the South by the name of Badger. I happened to have a case of root-filling on hand, in filling which he assisted me. The case was an abscessed front tooth for a lady in St. Louis. The abscess was cured and the root-canal filled with cylinders of No. 4 gold rolled on a broach. The gold was compacted with whalebone, such as is used to stiffen the lining of hats. I saw that tooth the other day, and there is no discoloration of it. It has never been touched from that day to this, and I am now working for the patient's grandchildren.

My friend spoke of oxyphosphate of zinc. I am a strong advocate of this, and think there is no better plastic in its proper place, —but that is not in root-canals,—and when it becomes properly understood by the profession it will be deemed one of the best things that has been produced. You ask me why. Because it may be used in teeth where the cavities extend so far below the gum, and where the structure is so soft that gold cannot be used. And after that has remained for one or two years the entire character of the structure will be changed,—will be hard and firm,—and you can then put in a perfect gold filling. I ask the profession to faithfully try this method. I would like to ask gentlemen who advocate the filling of canals with oxyphosphate of zinc how they expect to get it into the fine roots? Before it could be got half-way to the end of

the root it would be set, mix it as you will. I should like to see some of those things demonstrated.

DR. MORGAN: Is it possible for gutta-percha or any other known material to lose a part of its substance by evaporation and not be less in size or porous?

DR. MCKELLOPS: It evaporates while I am working it and leaves the substance intact.

DR. MORGAN: That is not an answer to my question. I want to know if any substance is lost by evaporation if the mass is not necessarily lessened in size and weight.

DR. MCKELLOPS: The evaporation occurs as I am putting it in place, but the gutta-percha adheres to the walls of the canal, and whatever shrinkage occurs by reason of evaporation is in the center, and that loss is supplied by the subsequent applications, so that when the operation is completed the evaporation has ceased and the filling becomes hard.

DR. MORGAN: If you work it dry.

DR. MCKELLOPS: It is nearly dry.

DR. MORGAN: Will the doctor answer my question? Is there any body of any kind, gutta-percha or anything else, that can lose a part of its substance by evaporation and not be lessened in size or made porous?

DR. MCKELLOPS: That depends upon circumstances.

DR. CROUSE: My friend from Philadelphia places great reliance upon coagulators, while Dr. Harlan insists that antiseptics which are not coagulators should be used.

DR. MORGAN: All antiseptics are coagulants.

DR. CROUSE: I think I can use either method with satisfactory results. Success depends largely upon the man at the end of the instrument. If there is any objection to oxychloride of zinc as a root-filling, it is that there is danger of forcing it out of the foramen. In my own practice I have settled down to two materials,—gutta-percha and gold or oxychloride of zinc and gold,—using the gold in filling the apical end of the canal. But I arose particularly to call attention to the magnificent system of regulating presented here by my young friend from New York. It has been lost sight of in the discussion of this old subject that we have gone over so often. If you have not examined the case, I hope you will. I believe I have been paid for coming to Saratoga by seeing that alone.

DR. MORGAN: I desire to correct a statement that I made. All coagulators are antiseptics, but possibly all antiseptics are not coagulators.

DR. PATTERSON: In answer to an intimation thrown out by Dr. Crouse, I would say that I think the subject of root-filling is par excellence the most important before the profession to-day. When I go through the country and see the great variety of imperfect methods pursued, I am convinced that the subject is not worn threadbare.

I desire to call your attention to an improved solution of gutta-percha over that so generally used,—that made with red base-plate gutta-percha,—and that is, a solution made with the white gutta-percha filling-material. The latter will shrink less.

In the tortuous canals I use this solution almost exclusively, filling the apical third or fourth of the canal and exercising great care not to force the filling beyond the apex. I then fill the rest of the canal with oxychloride of zinc, as I think its effect on the organic material remaining in the dentine puts the tooth in a better condition than it could possibly be if the canal were entirely filled with gutta-percha. I have cut teeth open which have been filled with both materials, and have found those filled with oxychloride of zinc to have much less odor than those filled with gutta-percha.

DR. WHITE: After preparing the hickory, I always dip it in chlora-percha. Dr. Harlan tells me I did not so state. I believe that when the foramen is thoroughly closed, it is a matter of no moment what we fill the remainder of the root with.

DR. J. TAFT: In regard to the use of the phrase "apical space" as usually employed, the question occurs, Is it not, in some cases at least, misleading, and would not "apical region" or "apical territory" be more distinctive and readily understood? It is important that our nomenclature be as direct and clear as possible. With reference to the preparation of root-canals for filling, it is important that each and every step be thoroughly accomplished, and in order to do this a goodly knowledge of the nature and condition of the tissue operated upon must be possessed by the operator. The age of the patient ought always to be noted, as the treatment and operation should be modified and regulated by the facts in this respect. In the early periods of life the canals through the ends of the roots of the teeth are larger than later, and more delicate and precise manipulation is required in the treatment. This is especially to be observed in those teeth the ends of the roots of which are not complete in growth. The difficulty attending such cases is in completely filling the termini of such canals, without encroaching upon the tissue beyond the end of the root, either with the instrument or the filling-material.

It must also be kept in mind that in early life the tubuli of the dentine are much larger than later, and that therefore the dentine contains a larger proportion of organic matter, and change in this is more likely to take place in early than in advanced life, and the change is more difficult to prevent. Change in the organic constituents of the teeth, and especially of the contents of the tubuli, is liable to take place in all the softer varieties of teeth after the death of the pulp. This in most cases may by proper treatment be prevented, in a good degree at least; and upon this in a large measure depends the desired success. The change or decomposition of the contents of the tubuli, or of the organic constituents of the teeth, can be prevented or minimized by the proper use of antiseptics and coagulants, and by desiccation; the latter is an important factor in this treatment. Securing the proper condition of the dentine of the roots of pulpless teeth is of vastly greater importance than the quality of the material with which the root is filled. In almost all cases of well-developed teeth there will be found a sudden and abrupt contraction of the canal at or near the end of the root; this is an important and valuable aid or guide in the treatment and filling of canals. If a root is properly treated and the terminal part of the canal hermetically closed, it is not a matter of great moment as to what the remaining part of the canal is filled with; indeed, some are in the habit of leaving them unfilled, and it is claimed, with entire satisfaction, or with results as good as by any other method.

Dr. Dwinelle: The exceedingly diverse, almost contradictory experiences related this afternoon go to show the great ability of nature to adapt herself to extraordinary contingencies. I think that in root-canals filled with wood alone the operation must necessarily be very imperfect; but my friend who advocates its use so strongly makes a correction upon himself and says he dips the wood in a solution of gutta-percha; that makes all possible difference in the matter. As has been stated, it does not matter so much what material is used for filling, provided the foramen is hermetically sealed. The wood being dipped in a solution of gutta-percha virtually makes the root-filling one of that material.

I have been in the habit of using antiseptics in different forms for the purpose of sterilizing the contents of the tubuli. They should be coagulated, so to speak, then their contents will no longer be a foreign substance. I do not think I have had a single failure in cases I have treated, if I have paid particular attention to treating the tubuli and their contents. When all things are favorable, I

often resort to the *immediate process.* My general practice for the last fifty years has been, after proper treatment, to fill the nerve-canals to their extremity with cones of gold foil wound upon Swedish broaches, packing them with attenuated and elastic filling instruments.

DR. ALLPORT: When I do a thing I want a philosophical reason for it. I not only want to know how to do it, but why to do it. Here is a drawing of a tooth with an approximal cavity and an exposed pulp which has to be extirpated. Here is another showing the cementum and enamel intact, but with the dentine and pulp both removed. And here is a third with the dentine replaced but with the pulp removed. If our old ideas are correct—and after what Dr. Hunt has said I am not certain that they are—(but if his ideas are correct it would not necessarily change the treatment that I am about to suggest)—the cementum receives its nourishment entirely from the peridental membrane, and is independent of the dentine or the pulp. So if you remove both the dentine and the pulp, you have remaining living, healthy cementum and inert enamel-tissue.

In taking out the pulp, as we have in the case represented here [referring to drawings upon the board], of course that cuts off the nourishment from the dentine and leaves these tubes filled with organic matter subject to decomposition. This decomposed matter generates sulphuretted hydrogen gas, which, no matter how well the pulp-cavity may be filled, will pass through the dentine into the cementum, and if it passes into the peridental membrane it will cause irritation. The evidence of this is found in the many cases where the cement is found to be perfectly black from coloring-matter that has passed through from decomposition.

When the pulp has been removed from a living tooth, the purification and the prevention of decomposition of the organic matter in the dentine is almost as important as the filling of the pulp-chamber and canals. The important thing is to get rid of the fluids contained in the tubuli, and that may be done in various ways, but I know of no better method than by the use of heat, which I apply by means of a hot-air syringe and a root-dryer. When this is done, there will be left in the tubuli a fiber which, with antiseptic treatment, will be apt to remain in a perfectly inert condition.

I am in the habit of filling root-canals with oxychloride of zinc, on account of the antiseptic qualities of the chlorine contained in that preparation. If the dentine is perfectly dry, that is readily

absorbed, and prevents, temporarily at least, any further decomposition. If the dentine can be made aseptic, I do not see why such a tooth should give any more trouble than a tooth with a living pulp; and the longer I live the less importance I attach to the pulp of the tooth. If the root-canal is filled with decomposed material, I am in the habit of injecting into it peroxide of hydrogen,—and we are largely indebted to our friend Harlan for the introduction, upon this side of the Atlantic, of that valuable agent,—which will readily reach and displace it. I treat with that as long as I can discover effervescence or other indication that there is decomposed material in the tubuli. After that I dry thoroughly.

I have no doubt good fillings may be made with gutta-percha and with gold, but those materials have no antiseptic properties and produce no chemical changes in the organic elements of the dentine, and for that reason I prefer oxychloride of zinc. I am in the habit of passing gold on a broach through the oxychloride and working it up as far as I can, and I have no fear of any trouble. If trouble arises, I think it is due to improper treatment rather than from forcing the oxychloride of zinc through the apical foramen. Plastic substances are not easily forced through it. You may force wire through, but it is difficult to carry gutta-percha or oxychloride of zinc through; but even if some of it should pass through, the chances are that any trouble it might cause would be dissipated in a few days.

Dr. Taft: I wish to ask Dr. Allport, if the decomposed matter is removed from the canals, the foramen sealed, the cavity absolutely dry and aseptic, what is the great necessity for filling such a canal?

Dr. Allport: I do not know that there is any great necessity for it; still there may be. I do not believe it very important, yet it is perfectly safe to do it, and it may not be safe not to do it, so it had better be filled.

Dr. Dwinelle: I think Dr. Allport is correct in his theory with regard to the pulp; that its object is to form the tooth and then to deposit secondary dentine to cover its retreat as age advances; after that has been accomplished, it is of but comparatively little importance. We have instances in extreme old age where the pulp and nerve has become entirely obliterated; its function having been completed, it is not of essential use to the animal economy. If the tubuli are sterilized and the fibers have been coagulated, they become inert, are not offensive, and do not throw off gases. I do not consider the pulp and nerves absolutely essential to the tooth after fifty or

sixty years of age; not that I would advocate the destruction of the nerve and pulp without cause, and while they remain as such, but practical investigation shows that after a certain age their vitality is not indispensable to the exterior well-being of the tooth.

DR. SUDDUTH: The point that has been dwelt upon, of the necessity for causing coagulation in the protoplasmic material in the canals, is of no value whatever, for micro-organisms will come after coagulation. The idea, so long extant, and so constantly rehashed regarding the office of the pulp-canal, is also obsolete. The whole story lies in securing an aseptic condition of the root-canal. I do not care what you use to fill the apical foramen with, so that it prevents the development of bacteria at that point, for thus you effect a proper condition.

DR. MARSHALL: Will organisms which live without oxygen produce decomposition, fermentation, or putrefaction?

DR. SUDDUTH: Putrefaction may be the secondary state of fermentation. So far as I know, fermentation does not go on without the presence of moisture and oxygen.

DR. MARSHALL: If the canal is perfectly sealed, how can micro-organisms set up any trouble?

DR. SUDDUTH: Micro-organisms will not enter except through the cavity of the tooth, and after it is perfectly sealed they cannot enter; so, as I said before, it makes little difference if the canal is not thoroughly filled, if the apex and also the cavity in the crown are properly sealed. Micro-organisms cannot and do not enter the tubuli, for the diameter of the latter is not sufficient to allow it. Four things are necessary for the development of micro-organisms: a living germ, a suitable medium, moisture, and the right temperature. If you destroy any one of these four conditions, you prevent the development of micro-organisms.

DR. MARSHALL: Do I understand you to say the micro-organisms cannot enter the tubuli?

DR. SUDDUTH: Yes, sir; only in cases where the dentine is decalcified.

DR. MARSHALL: I do not suppose they would get in there without decalcifying the dentine.

DR. SUDDUTH: That brings up the whole process of decay. The micro-organisms that cause decay when sugar is present produce lactic acid, which takes out the lime-salts of the tooth, and after that they digest and live upon the basis-substance, but in undecalcified dentine you never find micro-organisms.

DR. MORGAN: Will you draw the line between fermentation and putrefaction?

DR. SUDDUTH: There is no difference between the two, only one may be a primary and the other a secondary stage of the fermentation process.

DR. P. T. SMITH: We have, in my judgment, evidence in our daily practice establishing beyond controversy the fact of the formation of gases in the tubuli. If gas forms, it is an injury. Even the gases that form within the tubuli have sufficient expansive force to destroy the intertubular structure entirely. That point has not, I think, been spoken of before. Therefore the most careful method we can adopt to prevent such pressure, the better we may expect our results to be. We cannot make a tooth anhydrous, but we should make it as dry as possible.

I object to all the materials used for filling root-canals: to the chloride of zinc on account of its irritating qualities and because it will disintegrate in time. Gutta-percha is objectionable because it shrinks, and though it is compatible to the tooth it will decompose in time. Some speak of driving wood into a canal. We must remember that although the dentine is a dense structure it still may be overcome. The dynamic influence of this wooden peg upon absorbing moisture, as it will do, would be disastrous to its surroundings. There is the same trouble in filling with gold, tin, or lead, or any material that by dynamic force may injure the integrity of the dentine. Gold fillings of the finest character are sometimes the greatest failures, simply by their extreme density or by their centrifugal pressure. How much pressure do you suppose is exerted in putting in a gold filling by hand-pressure? You will be surprised when I tell you,—from forty to sixty pounds! When we use a mallet, we exert a force of from sixty to one hundred and twenty pounds and leave latent in the filling at least one-half of that, while the power of resistance of ordinarily organized dentine within the endurance of continued vitality is not equal to more than one-half of that.

In filling root-canals, if we use a material that will exert a pressure greater than the power of vital resistance of the dentine, we will defeat the object we seek to accomplish.

DR. MARSHALL: How can you demonstrate that the amount of hand-pressure is sixty pounds and that of the mallet one hundred and twenty?

DR. SMITH: I made a dynamometer about twenty years ago, a

sufficiently accurate instrument to lead me to these conclusions, and when I say from forty to sixty and from sixty to one hundred and twenty pounds I mean to say that these figures are approximately correct. If from what I have said you get an idea which will lead you on to the investigation of the subject, I shall have thus far done well.

DR. F. Y. CLARK: If I understood Dr. Sudduth, he said that bacteria never formed in normal dentine. I have found in a number of cases where the end of the root up to the foramen had been perfectly filled, and the cavity in the crown as well, that at the end of six months or a year upon removing the canal-filling I could detect a slight odor there. This led me to further investigation. Microscopists know very well that it is very difficult to examine dentine so as to discover micro-organisms; but if in a few drops of sterilized water which shows under the microscope no organisms you place a little of the dentine from one of these bad-smelling canals and agitate it for some time, micro-organisms will easily be found. Now, is it not reasonable to suppose that these are inaugurated by decomposed tissue of the dentine, or that they were there before the filling was put in? In treating the canals of a devitalized tooth, no matter how thoroughly you cleanse them, there will always be some *animal tissue left* that cannot be removed, as well *as a little moisture.* When the root is filled, this is closed in, and through fermentation converted into micro-organisms, which it is very important to prevent.

My own method is to cleanse the canal as perfectly as possible without enlarging it. The general enlargement of canals I regard as bad practice; where they are too small to be entered without enlargement, they will take care of themselves. When the canal is as thoroughly cleansed as possible,—always having the rubber-dam on,—I then disinfect completely, using preferably pure carbolic acid or creasote, and I always leave a little of the medicament in, and it is then ready to fill. If you take the filling out of a canal treated in this way twenty years after filling, you will detect the odor of the antiseptic, and I venture to say you will find no discoloration nor disintegration.

Fermentation is very easily understood. If you put a grain of sugar or animal tissue of any kind in a glass of sterilized water, in twelve hours you will have micro-organisms; in twelve hours more, perhaps, you will have putrefaction; and all that you have put into the glass has been converted into inert matter and is then ready for forming new life.

This subject of fermentation, if we studied it a little more in a simple way, would lead us to very valuable treatments of disease.

It seems to have been forgotten that the root-canals of different teeth are not always alike, and that one filling may be appropriate for one class that would not be for another. I know one gentleman who fills some canals with wood, and have seen teeth thus filled by him twenty years after, and they will compare favorably with any gold or oxychloride filling that can be shown. The method of using the wood is to reduce it by means of a draw-plate to little pins the size of a hair. The wood is then made antiseptic by dipping it in creasote or carbolic acid, and forced up nearly to the foramen; it is then withdrawn and cut half-way through at the distance you wish from the end, and then, the point having been dipped in a solution of gutta-percha, it is driven quite up to the end of the canal and broken off. I think you will then have the foramen as perfectly filled as possible. The root and crown can then be filled with whatever material you choose.

What I particularly wish to emphasize is that fermentation goes on in all cases of root-canals when and where they are not carefully antiseptically treated and filled as before stated.

Dr. Barrett: I wish to call attention to one fact, and that is the impossibility of the existence of anything like pus in the dentinal tubuli. I cannot see that there can be any such thing as a septic condition of the dentinal tubuli. In the first place, the contents are of an albuminoid character, and there is a spontaneous coagulation immediately upon the severance of those contents from vital vascular tissue. In the second place, after coagulation there is a melting down of the contents of the tubuli under the influence of micro-organisms. This presupposes that the influence of the micro-organisms is felt in the dentinal tubuli, a thing which the gentleman says is impossible. I believe he is mistaken in that.

Their influence within the dentinal tubuli is positive: there is a formation of lactic acid and the dissolving out of the lime-salts within the matrix of the tooth surrounding the dentinal tubuli, and thereby their enlargement. Therefore I think that all our talk based upon the presupposition that there is such a thing as a septic condition of the dentinal tubuli, before they shall be acted upon by the micro-organisms, is a mistake. The micro-organisms are not putrefactive organisms, but fermentative organisms. I cannot admit that putrefaction is a secondary stage of fermentation.

Putrefaction is fermentation; that is, it is the presence of certain

organisms, but not those of fermentation. The two processes are identical in this, that both are brought about by the action of micro-organisms, but by entirely distinct classes. There are fermentations which are not produced by the action of micro-organisms, such as the digestive ferments; but a septic condition of the dentinal tubuli would mean the presence of putrefactive organisms, and these are entirely inconsistent with the fermentative organisms which all admit are present. But there will be a septic condition of the *pulp-canal* which can be removed.

Having rendered the canals aseptic or brought them to a state of health, what more is wanted? Why should anyone wish to give medicine to a well man? Why should any antiseptic be left in the canal permanently? That is why I object to oxychloride of zinc, and because it is an irritant. I prefer to put into the canal a bland material which will have no medicinal action, and that which most nearly meets the condition in my judgment is gutta-percha.

DR. ALLPORT: What produces gas in the tubuli?

DR. BARRETT: There is no gas in the tubuli. I find putrefaction existing within the pulp-canal and chamber, but not in the dentinal tubuli. There is disintegration and breaking down, but not a putrefactive change, for that means the presence of putrefactive organisms, which the conditions of the case forbid in the dentinal tubuli.

DR. STOCKTON: In our very scientific discussion we forget the practical point, and I desire to correct the statement made by my distinguished friend, Dr. Dwinelle, that the pulp is of no use except for the development of the tooth, and that a pulpless tooth filled would last as long and be as good as though the pulp were alive in it. I do not believe any such statement, and I do not believe it should go out from this body uncontradicted. I believe the pulp was intended to be preserved and to conserve the health and usefulness of the tooth.

DR. DWINELLE: A word in reference to what has been said by my friend, Dr. Stockton. I do not advocate the destruction of pulps upon the principle that teeth are just as good without them, but I do state that I have in my practice teeth whose pulps were destroyed, and afterwards were properly treated, that have answered all the purposes of teeth and are retained to-day with every evidence of normality, some of them having been treated more than forty years ago, giving no indications of death,—I mean in the popular sense. They do not become foreign and extraneous in their character. My position is proved by the fact that in extreme old age, as I said before,

the nerve and pulp become obliterated. The pulp having exercised its functions is needed no longer.

I speak on this subject with some feeling, because the editor of the *Medical Record*, of New York, Dr. Shrady, attacked us as a profession and said that every tooth that was a dead tooth in this sense should be removed from the jaws, and abused us shamefully, showing most culpable ignorance and want of proper professional consideration at the same time. I do not recommend destroying the vitality of a tooth by any means. As far back as 1844 I recommended the saving of pulps alive where they were exposed. Some of the teeth thus exposed and treated are alive to-day. I do but put in a plea for what are called "dead teeth," since Dr. Shrady has attacked our profession in such a merciless way.

Dr. Marshall: Dr. Dwinelle lays the blame entirely on Dr. Shrady. Dr. Shrady did not say so many or so bad things of us as Dr. Sexton, one of his contributors.

Dr. Patterson: I think the blame should rest where it properly belongs, upon Dr. Shrady. I have recently read Dr. Sexton's book upon these subjects, and I think that the profession must give him the credit of doing more to call the attention of the medical profession to the remote, obscure, and reflex irritations and diseases of the dental arch than any other man in the United States, and for that he should have all honor. He has created a sentiment upon this subject which is not confined to the borders of our own country, and it has done a great deal of good, while at the same time he has made many glaring misstatements in regard to the possibilities of retaining dead teeth in the jaws. We should not criticise unless there is just reason. But Dr. Shrady's editorial notes have certainly been from first to last totally unjust, unscientific, and sometimes ungentlemanly to our profession.

Dr. Sudduth: I would like to say a word or two in regard to fermentation and putrefaction, as the statement I made has been contradicted, and also in regard to the presence of micro-organisms in the tubuli of the dentine.

There are no less than twelve or fifteen different kinds of fermentative processes. We have fermentation in the process of making bread. That is the simplest and most common kind. We have three or four different ferments that are found in the mouth in connection with caries of the teeth. Putrefaction is a fermentation process, and the only difference between putrefaction and the other processes of fermentation is that we have the odor with the putre-

factive process. This is on account of the fact that in putrefaction the nitrogenous portions of the tissues are attacked. The first stages of fermentation occur without odor, and putrefaction is the second, third, fourth, or fifth stage that comes in the process of the destruction of tissue. In regard to the statement regarding micro-organisms entering normal dentine, Dr. Clark said we never had instruments that would demonstrate micro-organisms in dentine. I do not think the blame should be put upon the instrument. If they are there, they can be demonstrated. I worked for two years investigating that point, and never was able to demonstrate them. They can only be found in the semi-decalcified dentine. The test that Dr. Clark speaks of is very crude. Finding micro-organisms in water in which dentine has been washed is no proof that they were in the tubuli of that dentine. It is simply proof that they were on the surface or connected with it in some other way.

SECTION I.

PROSTHETIC DENTISTRY, CHEMISTRY, AND METALLURGY.

VERBAL REPORT BY W. B. AMES, SECRETARY OF THE SECTION.

THERE have been at a late hour brought before the Section some specimens of bridge-work,—one of removable bridge-work, by Dr. Curtis, of Syracuse, that is novel in some respects. Dr. Curtis may offer something in explanation of his method.

Another bridge has been presented by Dr. Winder, of Baltimore, which was devised by Dr. Spencer, of Virginia. This, as far as I have examined it, is quite novel also. I do not know that anything further is necessary, except to pass these around, and to ask that Dr. Curtis be afforded an opportunity to explain his device.

DISCUSSION.

DR. CURTIS: I would like to call attention to the principal point of this movable bridge and state what caused me to invent it.

I was infringing the Low patent and I thought I might get into trouble thereby, so I devised this and had a search made at the Patent Office, and found it did not in any way infringe the patents of others. I then applied for patents on it so that others could not get possession of it.

The points of advantage are that the caps can be put on the teeth independent of the bridge, and can be left on for any length of time before the bridge is attached. It can be applied to teeth standing in any position without impairing the life of the teeth by grinding away their surfaces until they stand parallel to each other.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time, August, 1890:

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted August, 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Adopted August, 1879.

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination and graduation, and must also state these conditions in their next annual announcement.

Adopted August, 1880.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the Committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members who may neglect to make their own choice the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879	commencing	with	No. I.	1887	commencing	with	No. II.
1880	"	"	No. II.	1888	"	"	No. III.
1881	"	"	No. III.	1889	"	"	No. IV.
1882	"	"	No. IV.	1890	"	"	No. V.
1883	"	"	No. V.	1891	"	"	No. VI.
1884	"	"	No. VI.	1892	"	"	No. VII.
1885	"	"	No. VII.	1893	"	"	No. I.
1886	"	"	No. I.	1894	"	"	No. II.

Adopted 1879.

Resolved, That a paper presented to the Committee on Voluntary Essays and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterwards be read before the Association unless it is made the special order by resolution adopted.

Adopted 1885.

It shall be the duty of the Executive Committee of the Association to provide at the opening of each annual meeting a book for the registration of members or visitors as they arrive, which shall also give place of residence and hotel where each may be found.

Adopted 1886.

Resolved, That in the future this Association discountenance the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

Adopted 1886.

Resolved, That it shall be the duty of the chairman of the Credentials Committee to procure and keep a book wherein each delegate who wishes to be considered a permanent member of this Association shall enter his name.

Adopted 1886.

Resolved, That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in this Association without the payment of dues; and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

Adopted 1889.

WHEREAS, The National Association of Dental Faculties has passed a resolution adopting a three years' course of instruction after matriculation as essential to graduation; therefore

Resolved, That in the future no dental college shall be represented in this Association that does not comply with the course of instruction adopted by the college association named.

Adopted 1889.

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